Financial Stability Report

2021. 6

BANK OF KOREA

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

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

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

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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.

June 2021

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Governor

Bank of Korea

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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 May 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.

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Overview

Since the second half of last year, Korea's financial system has remained generally stable. Despite signs of resurgence of COVID-19, the Korean financial markets remained calm due to heightened expectation for economic recovery, with the financial intermediary function working well. The Financial Stability Index (FSI), showing overall financial system conditions, reached the crisis stage temporarily in April but continually decreased thereafter to stand at 1.8 (preliminary) in May, standing below the warning stage threshold (8.0).

Financial Stability Index (FSI)[1][2]
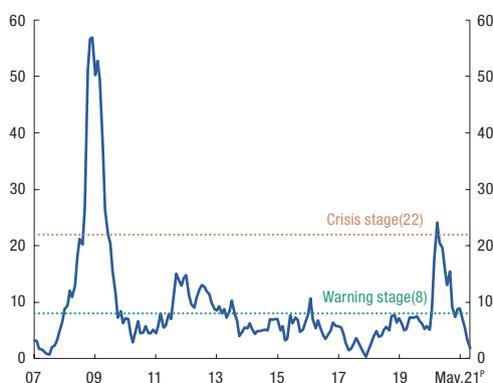
Notes: 1) A composite index (0-100) calculated by standardizing 20 monthly real and financial sector indicators related to financial stability. The warning and crisis stage thresholds are set at 8 and 22 respectively, using the"noise-to-signal ratio"method.
2) Preliminary figures for April and May 2021.
Source: Bank of Korea.

A look at financial stability conditions by sector shows that in the credit markets, private credit continued to grow at a fast pace as both households and firms increased borrowing, whereas the nominal GDP growth rate remained low, resulting in a steep rise in the private credit-to-nominal GDP ratio. Households' debt re-

payment burden worsened, due to an increase in household credit led by increased home mortgage loans and leasehold deposit(jeonse) loans, with the growth rate of household disposable income having been remained low. Corporate credit also showed sustained expansion, as demand for financing increased amid the prolonged pandemic. Although corporate sector's overall financial conditions have improved, the disparity among the debt servicing capacities of corporations widened. Meanwhile, delinquency rates of household and corporate loans have both continued to remain low, but insolvency risk could escalate going forward, particularly in vulnerable areas of both household and corporate sectors, should multispeed and incomplete recovery take place among sectors and industries.

In the asset markets, stock prices rose amid elevated long-term market rates, with investors' risk appetite and search for yield, while housing sales prices continued to increase rapidly. Long-term market rates have risen quite substantially driven by expectation for domestic economic recovery and by concerns over supply of Treasury bonds, whereas corporate bond credit spreads generally remained stable. Domestic stock prices have been hiked significantly by improved key economic indicators at home and abroad and by retail investors' active stock purchases. Although the increase rate of housing prices slowed modestly due to the announcement of government's housing supply policy, it continued to rise at a rapid pace. Close attention must be paid to the fact that, despite the spread of the virus, asset prices have been showing a steep increase particularly in the real estate market, driven by rising risk appetite and search for yield. Looking at the asset prices in consideration of economic fundamentals, the prices of certain assets in-

cluding real estates are estimated to have been considerably overvalued. Moreover, the growing speculative demand for crypto assets and their sharp price hike, with their economic value being unclear, imply that risk appetite in asset markets are rising, increasingly disconnected from economic fundamentals.

With regard to financial institutions, commercial banks' asset quality and profitability both remain solid. The asset soundness and profitability of institutions'(NBFIs) have improved amid sustained growth in assets. However, financial institutions'soundness indicators such as delinquency rates could deteriorate, should the government start to wind down their financial support.

As for foreigners' portfolio investment, stock investment has recorded a net outflow between January and May this year, while bond investment has posted a large net inflow. Foreigners' portfolio investment, particularly stock investment, could show escalated volatility going forward, driven by concerns over overvaluation in domestic stocks and inflation in major countries. In the meantime, residents' overseas portfolio investment increased significantly, particularly in stocks, owing to a rise in stock prices in advanced economies and in risk appetite.

The financial system's resilience, i.e. its capacity to withstand domestic and external shocks, has remained favorable, with financial institutions' capital ratio and liquidity ratio exceeding the regulatory standards. While financial system is expected to remain resilient going forward, a close attention should be paid to borrower's credit risk being affected by developments in economic recovery and market rate movements,

possibly deteriorating financial institutions' resilience. The nation's external payment capacity has remained stable as official foreign reserves recorded historical high.

Looking at the situation more broadly, the Korean financial system has been stable, with prudent financial markets, resilient financial institutions and smooth financial intermediary function backed by robust external payment capacity. However, financial imbalance has been escalating driven by expanded private sector leverage, heavy flows of fund into asset markets and asset price hikes, causing a rise in potential vulnerability within the financial system in medium- to long-term horizon. The financial vulnerability index (FVI)[1], an indicator of overall financial system vulnerability, sustained its upward trend, rising from 41.9 before the outbreak of COVID-19 in the fourth quarter of 2019 to 58.9 in the first quarter of 2021. If the financial imbalance that h1) as been building up so far further expands without being adequately managed, any external or internal shocks going forward could lead to greater financial and economic repercussions. Amid continuing uncertainties surrounding COVID-19 including emergence of variants, if the financial markets at home and abroad should face expanded volatility from, for instance, concerns about global inflation, investors' risk appetite could severely contract and cause adverse effects. Going forward, policy responses should be strengthened to target the rate of increase in private debt, financial institutions' asset quality management and asset market stability.

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1) For further detail regarding the FVI, please refer to <Analysis of Financial Stability Issues> 「Ⅰ. Financial Vulnerability Index: New Compilation Results and Implications」(page 131).

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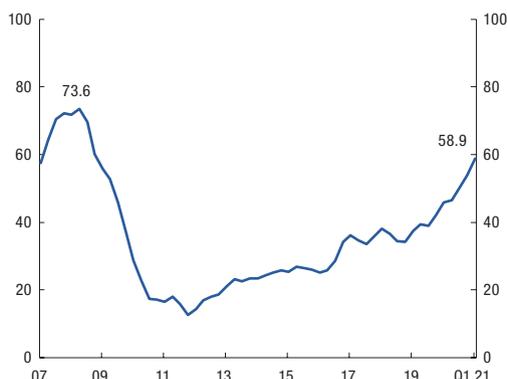
Notes: 1) A composite index (0-100) calculated by standardizing 39 indicators concerning three criteria for assessment (asset prices, credit accumulation and financial system resilience).

Source: Bank of Korea.

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 216.3% (estimated) at the end of the first quarter of 2021, showing a sharp rise of 15.9%p from the same period of last year. Private sector's demand for funds expanded owing to households'increased demand for housing-related loans and corporates'effort to secure funds in response to economic uncertainty, while nominal GDP growth rate remained weak.

Private credit[1]-to-nominal GDP[2] ratio
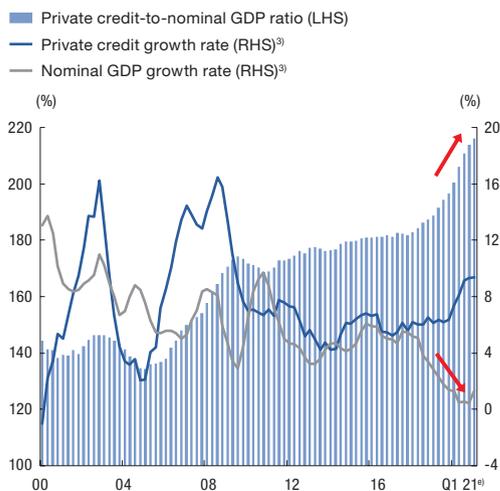
- Private credit-to-nominal GDP ratio (LHS)
- Private credit growth rate (RHS)[3]
- Nominal GDP growth rate (RHS)[3]

Notes: 1) Estimated figures for Q1 2021.
　　　 2) Sum of nominal GDPs in quarter concerned and in immediately preceding three quarters.
　　　 3) Year-on-year basis.
Source: Bank of Korea.

2 Household debt (household credit statistics basis) increased by 9.5% year on year to record 1,765.0 trillion won at the end of the first quar-

ter of 2021, showing a continued high rate of growth.

The household debt-to-disposable income ratio stood at 171.5% (estimated) at the end of the first quarter of 2021, a rise of 11.4%p from the same period of last year (160.1%), indicating a significant increase in debt servicing burden for households. The financial liabilities-to-financial assets ratio (flow of funds statistics basis), however, dropped by 2.9%p to 44.7% (estimated) at the end of the first quarter of 2021 from a year earlier (47.6%), due to the rise of stock prices.

Although the delinquency rate of household loan remains low, the default risk of particularly vulnerable households may increase if the economic recovery is differentiated by sector and industry in the future.
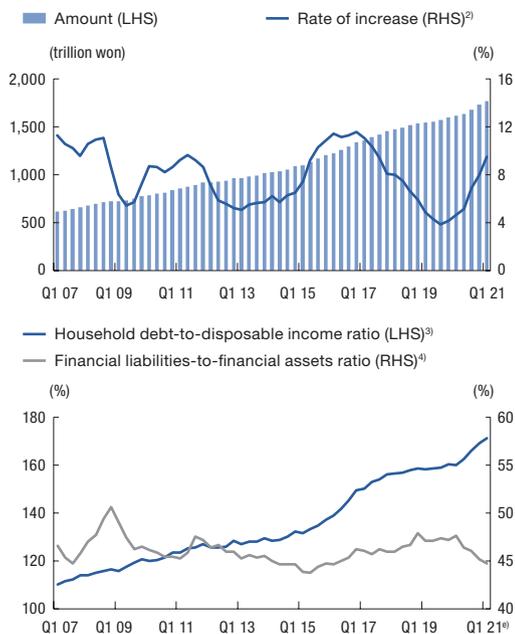
Household credit[1]

Notes: 1) Household credit statistics basis.
2) Year on year basis.
3) Disposable income for Q1 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 Q1 2021.

Source: Bank of Korea.

③ Corporate credit has continued to increase as corporate demand for funds soared affected by prolonged COVID-19 pandemic, while net issuance of corporate bonds and CP also continued to increase. Corporate loans increased substantially by 14.1% to 1,402.2 trillion won at the end of the first quarter of 2021 from the same period last year. By company size, the growth rate of loans to small and medium-sized enterprises (SMEs) accelerated driven by demand for operating funds, while that of loans to large enterprises dampened owing to increased funding through direct financial markets as stock price rises.

Corporate financial soundness has improved, but the debt servicing capacity differs more widely across corporations. Despite the increase in corporate borrowing, the overall corporate debt ratio (debt/equity) at end-2020 dropped to 77.2% from 81.1% in the first half of 2020, driven by corporate efforts to expand capital buffers. The interest coverage ratio (operating income / total interest expenses) rebounded in the second half of 2020 (3.4 in H1 to 5.4 in H2). However, the share of companies with debt ratio exceeding 200% increased relative to the first half, indicating that the gap in financial soundness among companies was widened.

Attention should be given to the possibility of the potential credit risk materializing particularly for vulnerable companies, should the recovery in corporate performance be delayed due to uncertainties over the pandemic situation or the escalation of US-China tensions.

Corporate credit

— Rate of increase in corpo-
rate loan[1] (LHS)[2]
▉ Net corporate bond issu-
ance (RHS)[3]

(%) (trillion won)

Corporate financial soundness

▉ Debt ratio (LHS)[4]
○— Interest coverage ratio
(RHS)[5]

(%) (times)
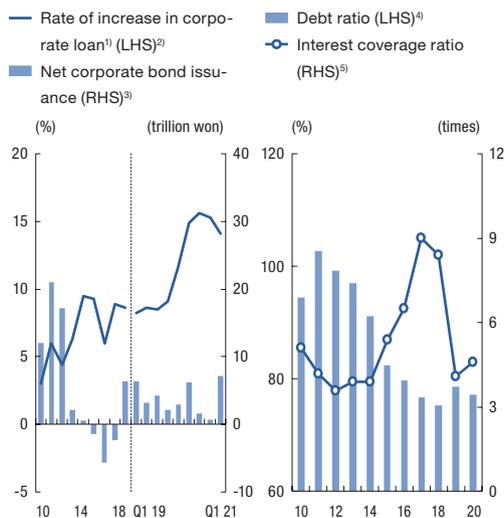
Notes: 1) Based on deposit-taking banks and non-bank financial
institutions (mutual credit cooperatives, mutual savings
banks, insurance companies and credit-specialized financial
companies); corporate loans by NBFIs for certain periods or
sectors include loans to financial and insurance businesses,
due to the limited availability of data.
2) Year on year basis.
3) During the quarter (since 2019).
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 considerably, af-
fected by the expectations for domestic and
overseas economic recoveries and concerns
about an excess Treasury bond supply.

Korean and US Treasury bond yields
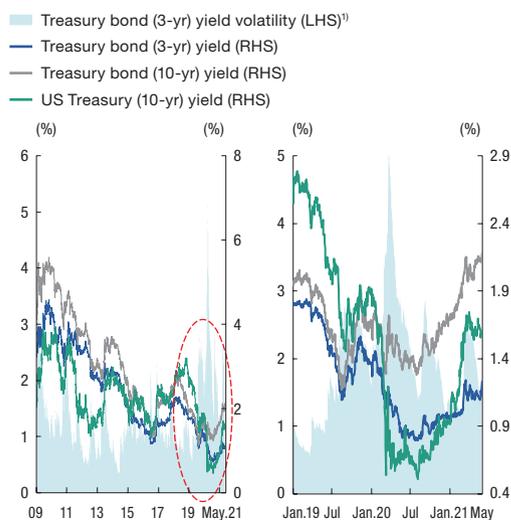
▉ Treasury bond (3-yr) yield volatility (LHS)[1]
— Treasury bond (3-yr) yield (RHS)
— Treasury bond (10-yr) yield (RHS)
— US Treasury (10-yr) yield (RHS)

(%) (%) (%) (%)

Note: 1) Daily volatility calculated using exponential weighted moving
average (EWMA) method.
Sources: Korea Financial Investment Association, Bloomberg.

Corporate bond credit spreads, widened slightly
in mid-March, due to the increased volatility in
Treasury bond yields, but has narrowed after-
wards hovering below the long-term average.

Corporate bond credit spreads[1], and spread across credit ratings[2]

- ▢ Corporate bonds (A-) - Corporate bonds (AA-)
- ▬ Corporate bonds (A-) - Treasury bonds
- ▬ Corporate bonds (AA-) - Treasury bonds

Long term average 141

Long term average 50

Notes: 1) 3-year maturity basis.
2) The long-term average is for the period between January 2010 and May 2021.

Source: Korea Financial Investment Association.

Stock price and stock price volatility indices

- ▬ KOSPI(LHS)
- ▮ V-KOSPI(RHS)[1]

(Jan 4, 1980=100)
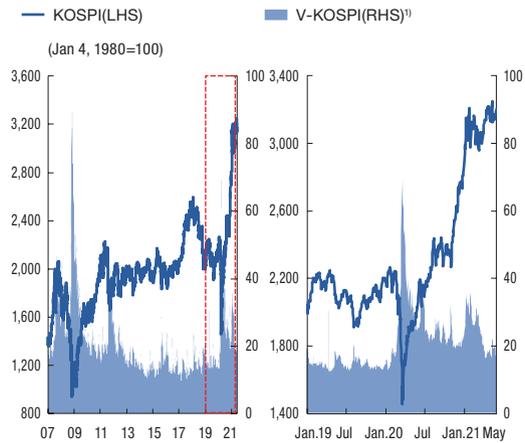
Note: 1) Volatility index calculated based on prices for options on the KOSPI200 index.

Source: KOSCOM.

▢2 The domestic stock market underwent a correction after a steep rally earlier this year, led by caution against short-term price hikes and by the increase in the US equity price volatility. Stock prices bounced back afterwards, driven by the US additi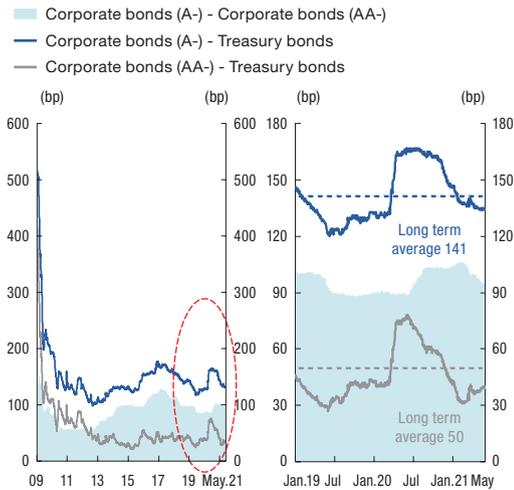onal stimulus package, and expectations for improvement in domestic and overseas economic indicators and corporate performance following the progress in COVID-19 vaccinations. The stock price volatility index (V-KOSPI) rose in line with a heightened external risk, but then stabilized gradually after March falling close to the pre-COVID-19 level of early 2020.

The price-earnings ratio (PER), showing the level of a firm's stock price relative to its profit, stood at 11.48 as of end-May, remaining above its long-term average (9.70 since 2010). The price-to-book value ratio (PBR), indicating a firm's stock price level relative to its liquidation value, surpassed its long-term average (1.02) at 1.21. As investors' risk appetite increased in the stock market, the equity risk premium declined rapidly to 6.53%p as of end-May, remaining below the its long-term average (7.71%p).

PER[1] and PBR[2]

Stock risk premium[4]

— PER(LHS)
— PBR(RHS)

(times) (times)

Long term PER(LHS)[3]
9.70

Long term PBR(RHS)[3]
1.02

(%p) (%p)

Long term
average[3] 7.71
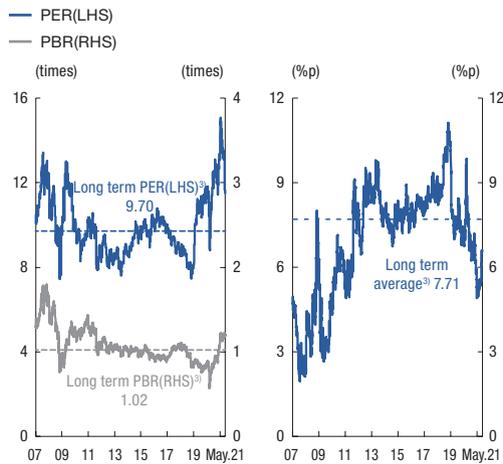
Notes: 1) MSCI basis (12-month forward) PER.
    2) KOSPI basis.
    3) Long-term average in the January 2010-May 2021 period.
    4) Earnings-price ratio (the inverse of 12-month-forward PER
       based on the MSCI)-Treasury bond yield (10-yr).
Sources: Bloomberg, Refinitiv.

③ Housing sales prices rose at a slightly slower pace entering this year, affected mainly by the government's housing market stabilization measures. However, they continue to show an uptrend, driven by concerns about a mismatch between supply and demand and expectations for further price rises.

Leasehold deposit(jeonse) and monthly rental prices, which soared in the second half of 2020, slowed sharp rises due to seasonal factors. However, factors pushing up the prices still remain, such as the reduced number of new apartment units supplied and the demand for new houses in the third new town in Seoul metropolitan area.

In the commercial real estate market, the price growth accelerated led by fund inflows, and the transaction volume continued to increase, despite falling in rental income resulting from de-

clining rental prices and increasing vacancies.

It should be noted that fund flows into the real estate market and a continued rise in real estate prices could expand financial imbalances and undermine financial stability in the event of a domestic or overseas shock.

Rates of increase[1] in housing purchase prices and rates of increase in commercial real estate price[2]

<Rates of increase in housing sales prices>

- - Nationwide   — Seoul Metropolitan area
— Other areas

(%) (%)

<Return on capital in commercial real estate>

— Offices   — Retail stores[3]

(%) (%)
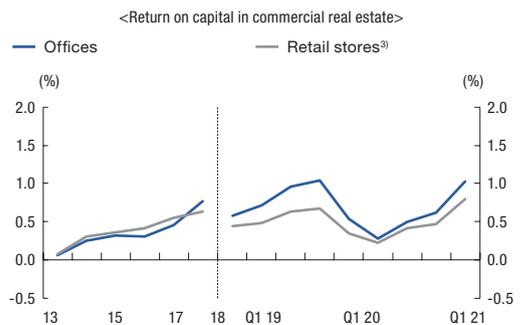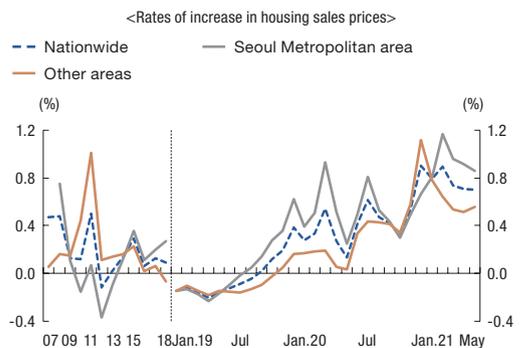
Notes: 1) For 2018 and earlier, annual average of monthly growth;
    2) Quarter-on-quarter rate of increase in asset value reflecting
       changes in land and building prices. For 2018 and earlier,
       annual average of quarterly growth.
    3) Medium- and large-sized property basis.
Sources: Korea Real Estate Board, Ministry of Land, Infrastructure
    and Transport.

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 continued to grow rapidly to 1,989 trillion won in the first quarter of 2021, up by 8.0% year on year.

Their asset soundness continued to improve with the substandard-or-below loan ratio falling to 0.36%, due to the Base Rate cuts and financial support measures such as maturity extensions and loan the deferral of principal and interest repayment.

Commercial banks' profitability improved modestly led mainly by the increase in their interest income. In addition to the positive growth in their net income, their return on assets (ROA) was up 0.01 %p in the first quarter of 2021 from the same period of last year (0.58%) to stand at 0.59% (annualized).

There is the possibility that banks' asset soundness indicators could deteriorate as the government's financial support measures are normalized going forward.

Commercial bank asset soundness and profitability
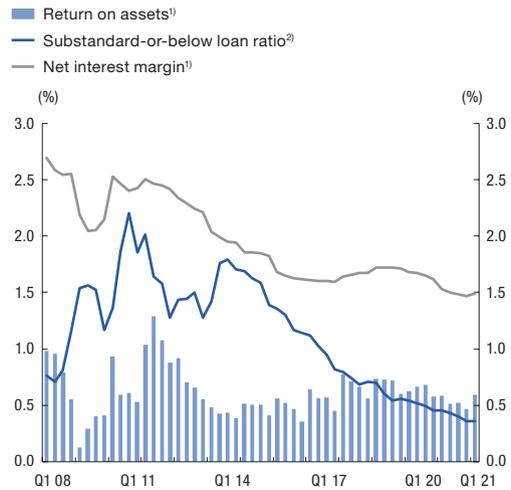
Notes: 1) Accumulated quarterly incomes annualized.
2) End-period basis.
Source: Commercial banks business reports.

2 The financial soundness of NBFIs remained favorable as both their asset soundness and profitability improved.

NBFI's assets continued to grow, recording 3,163 trillion won at the end of the first quarter of 2021, up by 7.5% year on year. Mutual savings banks'assets showed particularly high growth at 26.2% year on year.

In terms of the asset soundness, most sectors saw their delinquency rates and substandard-or-below loan rates decline year on year, mainly in mutual savings banks and credit-specialized financial companies.

The profitability improved significantly in all NBFI sectors including securities companies, mutual savings banks, and insurance companies. The major drivers were the increase in brokerage fees for securities companies, improved loan-to-deposit margins and the decline in loan

loss provision expenses for mutual savings banks, and the decline in loss ratio and the easing of reserve requirement for insurance companies.

NBFI substandard-or-below loan ratios[1)2)]

NBFI return on assets (ROAs)[2)3)]

- Insurance cos. (LHS) — Mutual credit cooperatives (LHS)
- Securities cos. (LHS) — Credit-specialized cos. (LHS)
- Mutual savings banks (RHS)
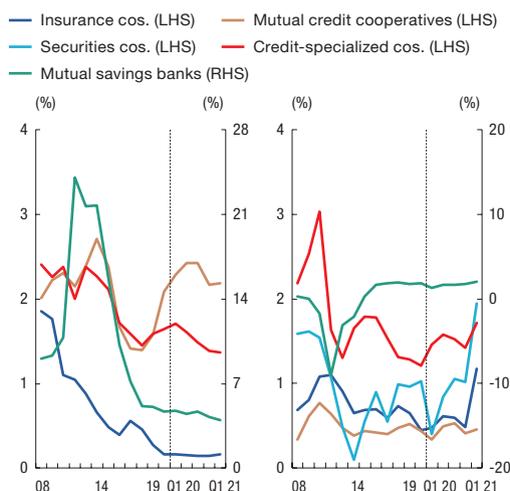
Notes: 1) End-period basis, excluding securities cos.
    2) For 2019 and earlier, annual basis; for 2020 onward, quarterly basis.
    3) Accumulated quarterly incomes annualized.
Source: Financial institutions business reports.

③ Financial institutions' interconnectedness through their funding and operations has strengthened. Mutual transactions among financial institutions amounted to 2,979 trillion won at the end of 2020, representing an increase of 11.2% compared to the end of last year. Mutual transactions accounted for 33.0% of the total assets of the overall financial sector, up by 0.3%p from the same period of last year (32.7%).

Looking at mutual transactions across financial sectors, those among banks grew by 18.1% from the same period of last year, showing the fastest growth. Mutual transactions among NBFIs grew by 12.7%, and those between banks and NBFIs increased by 8.0%. As a result, the

proportions of mutual transactions within the banking sector of total mutual transactions went up from 4.7% at the end of 2019 to 5.0% at the end of 2020, those within the NBFI sector from 59.3% to 60.1%, while those between the banking and NBFI sectors dropped from 36.0% to 34.9%.

Analyzing the default contagion and concentration risks based on the structure of mutual transactions across financial sectors, the contagion risk increased from the end of last year, while the concentration risk maintained a similar level.

Mutual transactions among financial institutions and across sectors[1)2)]
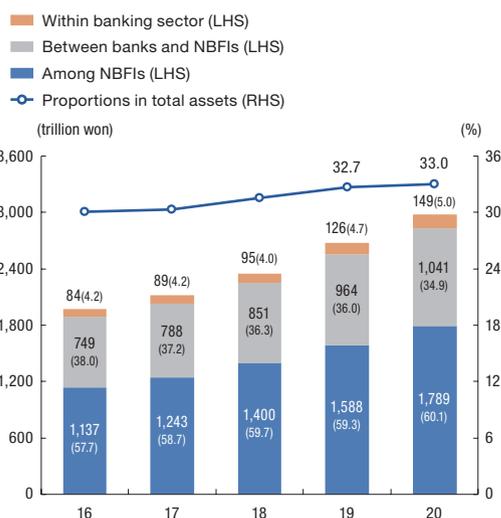
- Within banking sector (LHS)
- Between banks and NBFIs (LHS)
- Among NBFIs (LHS)
- Proportions in total assets (RHS)

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.
Source: Bank of Korea.

IV. Capital Flows

From January to May 2021, foreigners' domestic portfolio investment showed a net inflow of 10.5 billion dollars (-15.5 billion dollars for stocks and 26.0 billion dollars for bonds). Foreigners' stock investment recorded a net outflow as they sold stocks for a gain due to rising domestic stock prices. However, foreigners' bond investment registered net inflows on a large scale driven by public funds.

Going forward, foreigners' domestic portfolio investment is expected to record continuous inflows in terms of bond investment. However, volatility of stock investment flows could expand depending on changes in market expectations regarding the Fed's monetary policy stance.

The increase of residents' overseas portfolio investment was led by stocks, on the back of rising stock prices in advanced economy stock markets. The amount of rise came to 31.6 billion dollars (31.3 billion dollars for stocks and 300 million dollars for bonds) between January and April 2021, representing a sharp year on year increase.

Changes[1] in foreigners' domestic portfolio investment

Changes[2] in residents' overseas portfolio investment

■ Stocks   ■ Bonds   ◆ Total
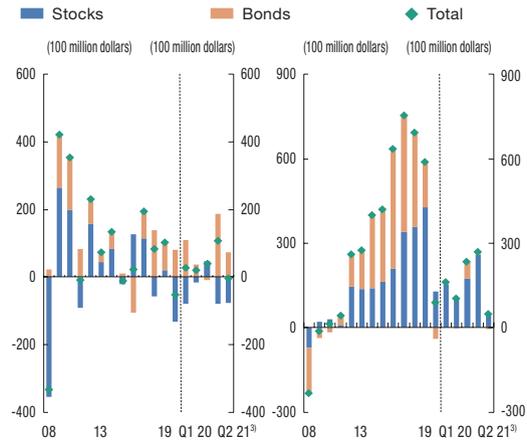
Notes: 1) A "+"means net inflow, and a "-"net outflow.
2) A "+"means net investment, and a "-" net withdrawal.
3) Changes in foreigners domestic portfolio investment is based on April-May; changes in residents overseas portfolio is based on April.

Source: Bank of Korea.

Resilience of Financial System

Ⅰ. Financial Institutions

① Commercial banks' resilience remained generally solid, with their capital adequacy 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 17.65% and 14.85% at the end of the first quarter of this year, up by 0.50%p and 0.57%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 0.2%p from the end of last year to reach 94.9% at the end of April 2021. The decrease was attributable to a rise in net cash outflows affected by an increase in standby money held by corporations and other financial institutions. When the mitigation of liquidity regulations are lifted forward, the reduction in banks' lending capacities and the rise in funding costs are likely to act as risk factors.

Commercial bank total capital ratios

— 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)
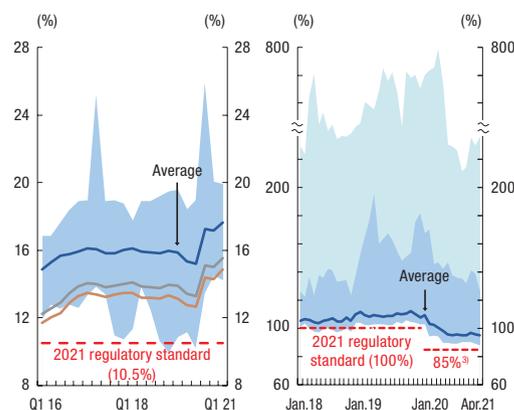
Notes: 1) The shaded area indicates the distribution of individual banks, and the deep shaded area indicates distribution with Internet-only banks excluded.
2) High-quality liquid assets / Total net cash outflows over next 30 calendar days.
3) 85% for a limited period from April 2020 to September 2021.
Source: 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 21.3%p from the end of last year to reach 719.9% at the end of the first quarter of 2021. Meanwhile, capital adequacy ratios of other NBFIs fell to some extent. The risk-based capital ratio (RBC ratio) of life insurance companies declined by 24.1%p compared to the end of last year to stand at 273.2%. Mutual savings banks' equity ratio and credit-specialized financial companies' adjusted equity ratio dropped by 0.3%p from the end of last year to come to 13.9% and 18.6%, respectively. The net capital adequacy ratio of mutual credit cooperatives also fell by 0.2%p from the end of last year to

reach 8.2%.

We should remain vigilant against the possibility that the expansion in financial market volatility and the deterioration in debt servicing capacities of vulnerable borrowers could undermine NBFIs' resilience.

NBFI capital adequacy ratios[1]
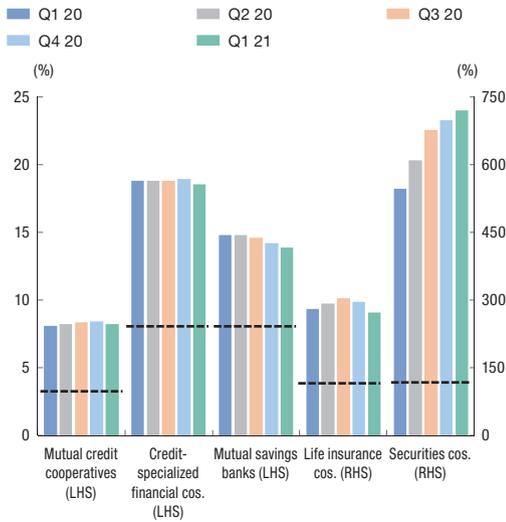
Notes: 1) Mutual credit cooperatives' net capital ratio (supervisory standard 2%; 4% for MG community credit cooperatives and 5% for NongHyup), credit-specialized financial companies' adjusted capital ratio (7%; 8% for credit card companies), mutual savings banks' BIS capital ratio(7%; 8% for banks with 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.
Source: Financial institutions' business reports.

II. External Payment Capacity

Korea's external payment capacity stayed generally favorable.

Official foreign reserves recorded an all-time high at 456.5 billion dollars, while net external assets fell modestly year on year (-1.0 billion dollars).

The ratio of external liabilities relative to nominal GDP rose year on year. As this is due mainly to the growth in foreigners' domestic bond investment, the soundness of our external debt is regarded as solid overall. The ratio of short-term external debt to official foreign reserves decreased slightly year on year from 37.6% to reach 37.1% at the end of the first quarter of 2021.

Meanwhile, although Korea's short-term external debt has been on the rise, it is not judged to be a concerned situation in terms of external debt soundness. However, as the external debt could increase further in the future, it is necessary to carry out continuous monitoring of related developments.

External debt-to-nominal GDP ratio[1]

■ Net external assets (LHS)
— External debt / Nominal GDP (RHS)
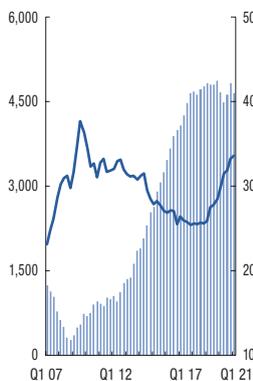
(100 million dollars)　　(%)

Short-term external debt-to-official foreign reserves ratio[1]

■ Short-term external debt (LHS)
— Short-term external debt / Official foreign reserves (RHS)

(100 million dollars)　　(%)
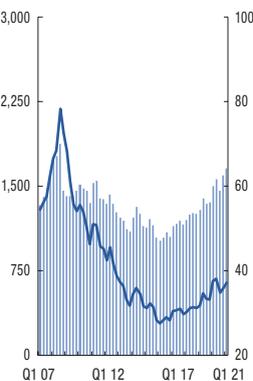
Note: 1) End-quarter basis.
Source: Bank of Korea.

III. Financial Market Infrastructures

Despite the prolonged COVID-19 pandemic, the major payment and settlement systems including BOK-Wire+ have been operated smoothly, with settlement risks managed stably amid a steady 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 20.5% and 2.9%, respectively, during the first 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 17.7%. 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 74.7% in the first 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]
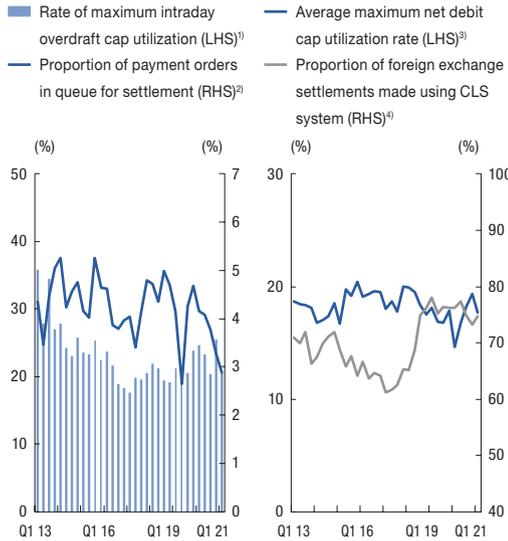
Notes: 1) Average of daily maximum intraday overdraft cap utilization rates of participants.

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 CLS system, transactions made by domestic banks and foreign bank branches.

Source: Bank of Korea.

Financial Stability Situation by Sector

Ⅰ. Credit Markets

The private credit-to-nominal GDP ratio,[1] an indicator of the level of private sector leverage, ticked higher amid a continuous slowdown in GDP growth.

Household credit continued its steep upward climb and the household debt service burden increased as improvement in income conditions was delayed due to the prolonged COVID-19 pandemic.

Corporate credit also continued to grow robustly on increased loans and the net issuance of commercial paper (CP) as the protracted pandemic heightened companies' need for capital. Although the financial soundness of companies has improved, disparities among companies have further widened (Figure Ⅰ-1).

Figure Ⅰ-1. Map of changes in credit market conditions
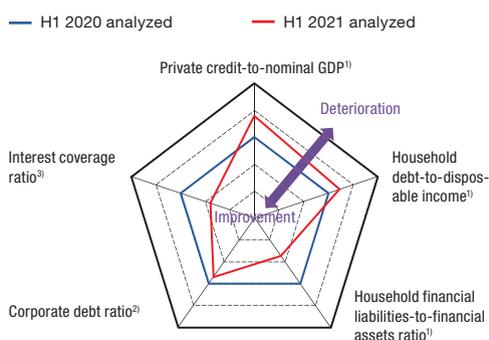
Notes: 1) Extents of change as of end-Q1 2021 compared to end-Q1 2020 indexed.
    2) Extents of change as of end-2020 compared to end-June 2020 indexed.
    3) Extents of change as of 2020 compared to July 2019-June 2020 period indexed.
Source: Bank of Korea.

1. Credit Leverage

Private credit-to-nominal GDP ratio continuously on the rise

At the end of the first quarter of 2021, the private credit[2]-to-nominal GDP ratio took a year on year leap of 15.9%p to 216.3% (estimated).[3] While nominal GDP[4] growth has slowed, private credit has been continuously growing at an accelerated rate. At the end of the first quarter of 2021, private credit growth (year-on-year basis) recorded a similarly high rate of 9.4% as at the end of the previous year (9.3%). Meanwhile, nominal GDP grew 1.3% year on year, increasing at an extremely slow rate, even if faster than the rate at the end of the previous year (0.4%) (Figure Ⅰ-2).

Figure Ⅰ-2. Private credit[1]-to-nominal GDP[2] ratio
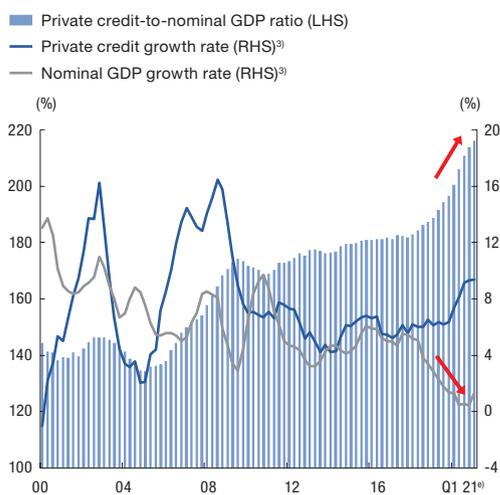
Notes: 1) Estimated figures for Q1 2021.
    2) Sum of nominal GDPs in quarter concerned and in immediately preceding three quarters.
    3) Year-on-year basis.
Source: Bank of Korea.

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1) The level of private sector leverage is assessed using a variety of financial and real economic indicators, such as the rate of private credit growth 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 ("BCBS" hereafter, 2010) under the Bank for International Settlements (BIS).

Continuous uptick in both household and corporate leverage

Credit leverage continued on an upward path in both the household and corporate sectors. At the end of the first quarter of 2021, the household credit-to-nominal GDP ratio jumped 9.1%p year on year to 104.7% and the corporate credit-to-nominal GDP ratio rose by 6.8%p year on year to 111.6%.

The rate of household credit growth further accelerated at the end of the first quarter of 2021 to 10.9% year on year on the back of rising credit demand associated with housing sales and leasehold deposit transactions.

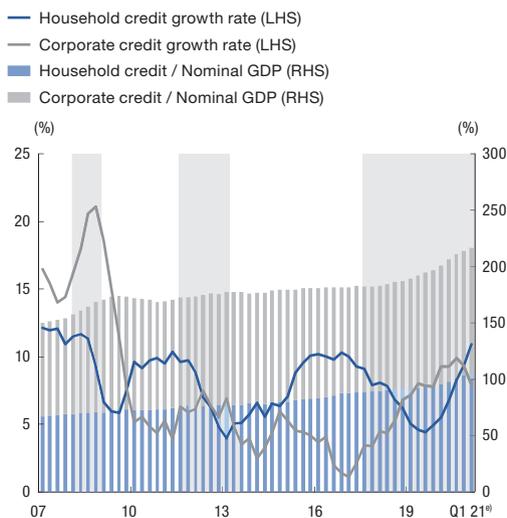Corporate credit also registered robust year-on-year growth of 7.9%, fueled by the demand to secure cash flows in anticipation of a prolonged pandemic and as the access to credit was eased by loans and other financial support measures from the government (Figure I -3).

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

Notes: 1) Estimated figures for Q1 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 gap between credit leverage and its long-term trend has widened continuously since the first half of 2020, when it turned positive. The household credit-to-nominal GDP gap[5)]

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 (private and government loans) and corporate debt (private and government loans, securities other than shares) as reported in the flow of funds statistics.

3) Household and corporate credit based on the first quarter of 2021 flow of funds statistics were estimated through a linear regression model using the rate of household credit growth (based on the household credit statistics) and the rate of corporate credit growth by 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 immediately 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, systemic risk is measured as a time series, generally using the gap between this ratio and its long-term trends, in other words its deviation from long-term trends, as the common indicator. 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 is much shorter in Korea than in other OECD economies.

turned positive during the second quarter of 2020, up 5.8%p during the first quarter of 2021, the highest level since the global financial crisis (+1.7%p during the second quarter of 2008).

The corporate credit-to-nominal GDP gap, entered positive territory during the first quarter of 2020, moved up 8.0%p during the first quarter of 2021, inching closer to the level during the global financial crisis (+10.6%p during the third quarter of 2009) (Figure Ⅰ-4).

2. Household Credit

Continued steep upward trend

Household debt (based on household credit statistics) continued on a steep upward curve to reach KRW 1,765.0 trillion at the end of the first quarter of 2021, up 9.5% from the same period a year ago (Figure Ⅰ-5). Of this amount, KRW 1,666.0 trillion was accounted for by household loans (94.4% of total household debt) and KRW 99.0 trillion (5.6%) by merchandise financing.[6]

Figure Ⅰ-4. Private credit-to-nominal GDP ratios and gaps,[1] by sector
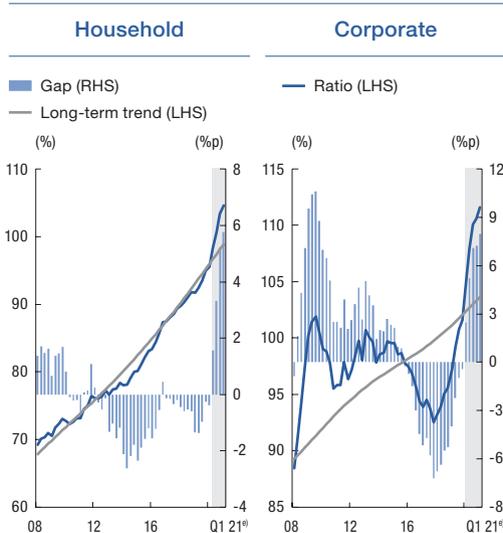
Notes:　1) Differences between credit-to-nominal GDP ratio and long-term trend value based on HP filter, by sector.
　　　　2) The shaded area indicates the period during which the gap was positive.
Source: Bank of Korea.

Figure Ⅰ-5. Household credit[1]
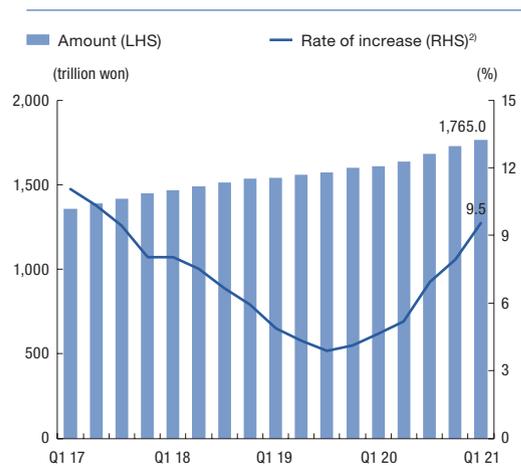
Notes: 1) Household credit statistics basis.
　　　 2) Year-on-year basis.
Source: Bank of Korea.

By loan type, home mortgage loans climbed by 8.5% year on year to arrive at KRW 931.0 trillion at the end of the first quarter of 2021. This increase was due to the sustained loan demand associated with housing sales and leasehold deposits amid rising prices. Unsecured and other loans amounted to KRW 735.0 trillion, representing a 10.8% year-on-

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6) Merchandise financing refers to direct credit offered by vendors and providers of goods and services for credit purchases.

year increase. However, the rate of growth of unsecured and other loans has decelerated sharply since early this year as regulatory oversight tightened on this type of loan (Figure Ⅰ-6).

Figure Ⅰ-6. Household loans,¹⁾ by loan type
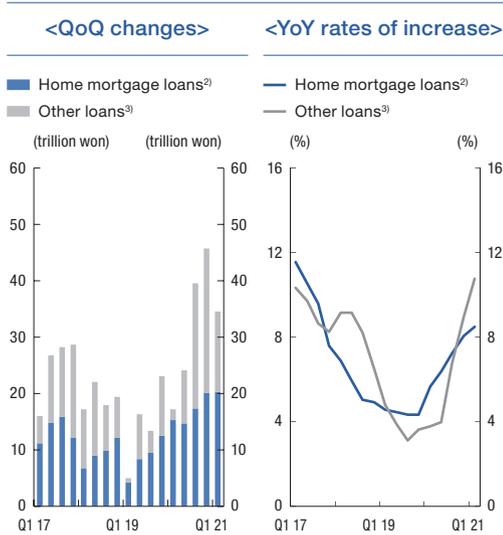
Notes: 1) Household credit statistics basis.
2) Home mortgage loans, leasehold deposit fund loans, etc.
3) Secured loans not collateralized by housing, unsecured loans, guaranteed loans, etc.
Source: Bank of Korea.

By type of financial institution, banks' household loan balance jumped 11.3% year on year to KRW 868.5 trillion at the end of the first quarter of 2021. Household loans by non-bank financial institutions (NBFIs) rose by 7.8% to KRW 617.2 trillion, growing at an accelerated rate since the second half of 2020 (Figure Ⅰ-7).

Figure Ⅰ-7. Household loans,¹⁾ by financial sector
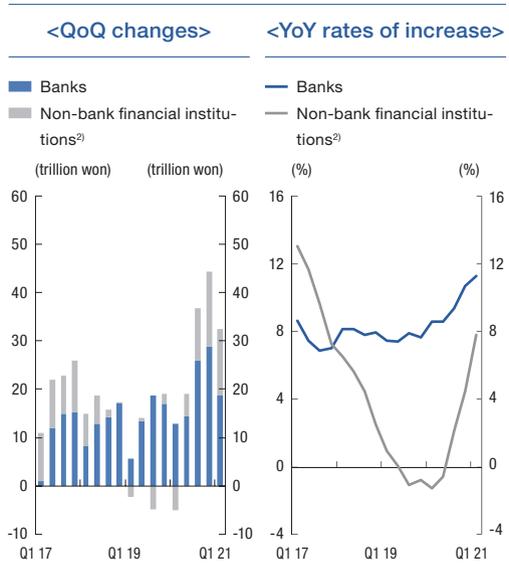
Notes: 1) Household credit statistics basis.
2) Non-bank deposit-taking institutions and others (excluding Korea Housing Finance Corporation, etc.).
Source: Bank of Korea.

Increased debt service burden for households

At the end of the first quarter of 2021, the household debt-to-disposal income ratio (based on household credit statistics) increased 11.4%p year on year to 171.5% (estimated), suggesting that households' debt service burden has risen sharply in recent months (Figure Ⅰ-8).

Figure I-8. Household debt[2])-to-disposable income[1]) ratio

- ■ Ratio (LHS)
- — Rate of increase in household debt (RHS)[3]
- — Rate of increase in disposable income (RHS)[3]
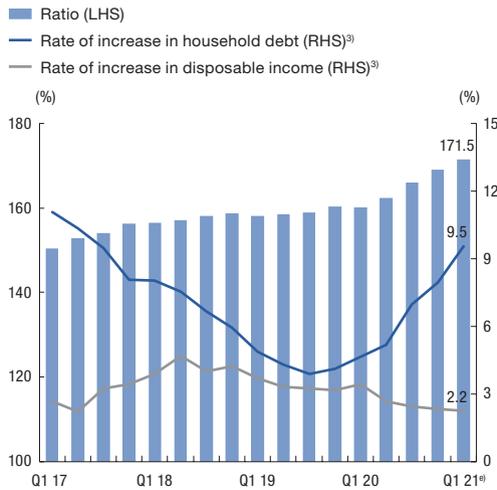
Notes: 1) Disposable incomes for Q1 2021 are estimated using the average of the household disposable income-to-gross national income ratios for the immediately preceding three years.
2) Household credit statistics basis.
3) Year-on-year basis.
Source: Bank of Korea.

Figure I-9. Financial liabilities-to-financial as- sets ratio[1])

- ■ Ratio (LHS)
- — Rate of increase in assets (RHS)[2]
- — Rate of increase in liabilities (RHS)[2]
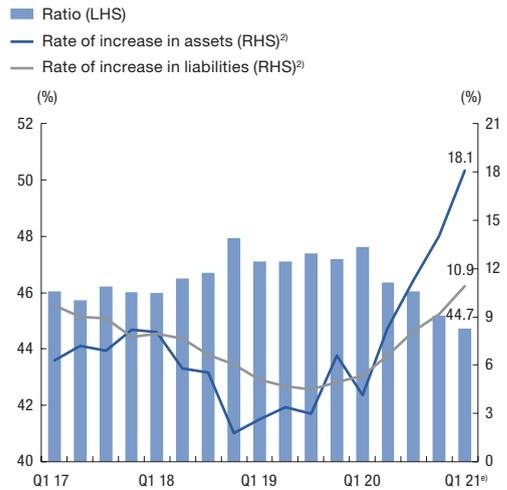
Notes: 1) Flow of funds statistics basis (estimated figures for Q1 2021).
2) Year-on-year basis.
Source: Bank of Korea.

Meanwhile, the financial liabilities-to-finan- cial assets ratio (based on flow of funds statis- tics) stood at 44.7% (estimated) at the end of the first quarter of 2021, representing a year- on-year drop of 2.9%p. The accelerated rate of growth in financial assets (18.1% year on year), caused mainly by sharply higher equity valuations, significantly outpaced the rate of growth in financial liabilities (10.9%) during this period (Figure I-9).

Declining share of vulnerable borrowers

The share of borrowers with comparatively low debt repayment capacities in total bor- rowers continued the downward trend from the previous period. At the end of the first quarter of 2021, borrowers with low income (bottom 30%) or low credit ratings (credit score of 664 or below), who furthermore have multiple household loans, accounted for 6.3% of all borrowers, down 0.1%p from the end of the previous year. In terms of loan value, vul- nerable borrowers accounted for a 5.3% share (KRW 87.5 trillion), unchanged from the level at the end of 2020 (5.3%, KRW 85.7 trillion) (Figure I-10).

Figure Ⅰ-10. Proportions of vulnerable borrowers

Number of borrowers basis   Loan amount basis

Source: Bank of Korea (Consumer Credit Panel).

Figure Ⅰ-11. Shares[1] of household loans, by borrower credit score and income level

By credit score[2]

By income level[3]

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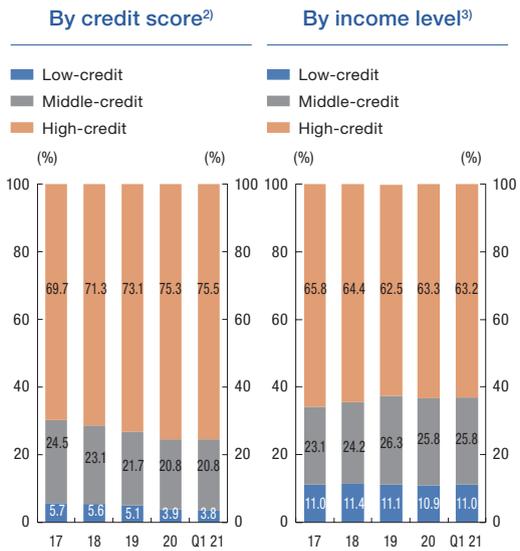
Notes: 1) Loan amount basis.
2) High-credit (scores greater than or equal to 840), middle-credit (scores 665-839), low-credit (scores less than or equal to 664).
3) High-income (top 30%), middle-income (30-70%), low-income (bottom 30%).

Source: Bank of Korea (Consumer Credit Panel).

By borrower profile, while the share of borrowers with high credit ratings[7] continued to edge higher, the share of high-income borrowers remained mostly unchanged from the end of 2020. At the end of the first quarter of 2021, the share of borrowers with high credit ratings stood at 75.5%, up 0.2%p from the end of the previous year, and the share of high-income borrowers at 63.2%, down 0.1%p from the end of the previous year (Figure Ⅰ-11).

At the end of the first quarter of 2021, the household loan delinquency rate dropped 0.09%p year on year to 0.18% for bank loans and fell 0.45%p to 1.48% for non-bank loans (Figure Ⅰ-12).

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7) In 2021, the rating system for consumer creditworthiness was changed from a grade-based system to a score-based system. 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 665 low.

Figure I-12. Delinquency rates[3] of household loans extended by banks and NBFIs[1,2]

- Banks' household loans
- Banks' home mortgage loans
- NBFIs' household loans
- NBFIs' home mortgage loans
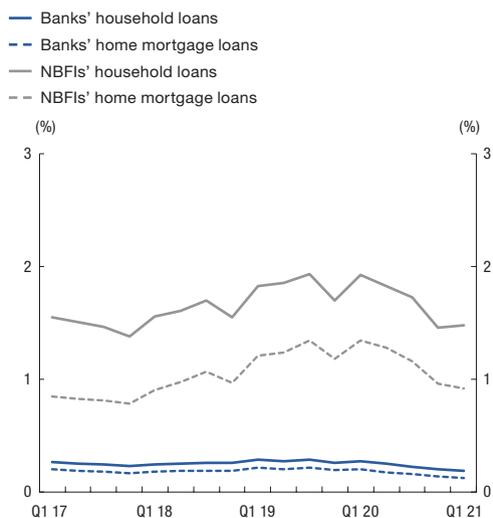
Notes: 1) Mutual savings banks, mutual credit cooperatives, insurance companies, credit-specialized financial companies, etc.
2) Excluding insurance contract loans for insurance companies, and including card (excluding merchandise credit), installment and lease assets for credit-specialized financial companies.
3) 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).

Sources: Financial institutions' business reports.

The debt repayment capacity of households has been negatively affected by the prolonged pandemic, which has delayed improvement in income conditions amid continuously rapid growth in household debt. Even though credit risk has not yet been actualized, with loan delinquency rates still remaining low, attention must be paid, going forward, to the possibility of a rise in default risk, particularly among vulnerable households, if the economic recovery proves uneven, as financial relief programs by the government are gradually phased out.

Box 1.

Household Loan Delinquency Rate by Vintage

The delinquency rate of household loans in Korea declined from the second half of 2013 until 2018, and turned slightly. However, since the outbreak of COVID-19 last year, the rate has been at a considerably low level due to the interest rate cuts and implementation of financial support measures,[1] despite the economic contraction. Still, the low delinquency rate observed recently may not adequately reflect the actual credit risk of borrowers. Sustained social distancing, income reduction, and shortage of funds for living expenses may have boosted the potential default risks in vulnerable sectors. If the debt repayment capacity does not recover following the expiry of various support measures such as loan maturity extensions and deferral of interest payments, credit risks will likely emerge among these borrowers.

Hereunder, through an analysis[3] of loan delinquency rate by time the loan was made (vintage) (hereinafter referred to as "vintage delinquency rate,"[2] this section examines changes in the delinquency rate according to the time elapsed by sector, estimates the extent of potential default risks in household loans, and predicts the movement of the delinquency rate going forward.

Trends and characteristics of vintage delinquency rate

A review of the changes in the vintage delinquency rate of loans after the loans were made (2013-2020) showed that the rate generally tended to rise as the loan balance decreased due to principal redemption, while the arrearages increased with the passing of time. However, the pace of such rise slowed significantly after a certain period (two to four years), following a rapid rise in the first one or two years.

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1) Base rate cuts (1.25% → 0.50%, reduction of 0.75%p, from March 16 to May 28, 2020); support measures for vulnerable individual borrowers vulnerable to the pandemic, such as deferral of principal and interest repayment of household loans, conversion of non-bank loans with high interest rates to ones with lower rates, and debt rescheduling and purchase of delinquent individual loans (since April 2020); various income support measures, including the distribution of emergency disaster relief funds and employment stability support funds (since May 2020); and measures for small businesses, such as supply of new credit (including loan guarantees), loan maturity extension, and deferral of principal and interest repayment (after February 2020).

2) While the delinquency rate is calculated for a collection of loans that were granted at different times, the vintage delinquency rate is calculated by classifying loans by time granted. The vintage delinquency rate curve enables changes in the delinquency rate after the loan was granted to be tracked over time, and is useful in predicting the path of the delinquency rate.

3) Hereunder, based on loan data listed in the Consumer Credit Panel database and delinquency history by borrower (credit assessment information from NICE Information Service and delinquency data from Korea Credit Information Services), statistics on the vintage delinquency rate were estimated on a trial basis. To increase the validity of the vintage curve, we collected panel data by borrower that contain time loan was granted, change of loan balance, loan maturity extension (loan holding period), time of delinquency and delinquency period, and estimated vintage delinquency rate by quarter, and then converted those quarterly rates to annual ones. Due to the constraint of data availability, vintage analysis was conducted from 2013.

Trend of vintage delinquency rate

Legend: 2013, 2014, 2015, 2016, 2017, 2018, 2019, 2020

Source: Bank of Korea staff calculation.

Major characteristics of the vintage delinquency rate of Korea's household loans are as follows.

① If the vintage curve of a given year lies below (above) that of the preceding year, credit risk generally decreases (increases), leading to a decline (rise) of the delinquency rate of total household loans. In particular, this is seen more prominently when the delinquency rate of total household loans makes a transition to an upward or downward trend.[4] As the vintage curve of 2014 fell well below that of 2013, the delinquency rate of total household loans declined. On the other hand, the vintage curve of 2018 rose moderately above that of 2017, resulting in a rise of the delinquency rate of total household loans. Currently, the vintage curve of 2020 remains at a considerably lower position than that of 2019.

② The vintage delinquency rate of loans granted at a time when household loans were increasing rapidly (slowly) tended to move upwards for a longer (shorter) period, raising (lowering) the delinquency rate of total household loans in the long term. Regarding loans granted in 2015 and 2016,[5] when household loans were rising at a higher pace, the vintage delinquency rate was lower than its long-term average rate at an earlier period when the loan amount increased significantly, but continued to rise after three years. On the other hand, as for loans granted in 2013, 2014, and 2019, when household loans were rising at a slow pace, the vintage delinquency rate moved above its long-term average rate for three years and trended significantly lower thereafter.

③ As for new loans granted in 2020, when the pandemic was raging, the vintage delinquency rate recorded during the first four quarters was significantly lower than that of existing loans granted from 2013 to 2019. Moreover, the vintage delinquency rate of existing loans (i.e., long-term average of loans granted from 2013 to 2019) fell rapidly during the fourth quarter of 2020. This suggests that various measures taken by policy authorities to mitigate the impact of COVID-19 (interest rate cuts, deferral of principal and interest repayment, disbursement

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4) The delinquency rate of all household loans stood at around 2.5% in the wake of the global financial crisis in 2008 and shifted to a decline in 2013 and 2014 (2.4% at the end of the second quarter of 2013 → 1.7% at the end of the fourth quarter of 2014). It then edged up slightly in 2017 and 2018 (1.0% in the third quarter of 2017 → 1.1% in the fourth quarter of 2018).

5) The growth rate of household loans (household credit statistics basis) was over 10% in 2015 and 2016 (10.9% in 2015 and 11.6% in 2016) and halved to around 5% in 2013, 2014, and 2019 (5.7% in 2013, 6.5% in 2014, and 4.1% in 2019). In 2020, household loans resurged significantly amid the protracted outbreak of COVID-19 (2020: +KRW 127.1 trillion, average of 2015 and 2016: +KRW 128.6 trillion).

Consequently, the vintage delinquency rate curve for new loans granted in 2020 at significantly lower rates under the emergency measures kept rising for a longer period, as witnessed in 2015 and 2016.

of disaster relief funds, etc.) may have lowered[6] the delinquency rate of total household loans by delaying the default risk of borrowers.

Major characteristics of vintage delinquency rate

<Loans granted when delinquency rate turns to downward trend[1]>

(%)   (%)
— 2013
  2014

Quarter
0   4   8

<Loans granted when delinquency rate turns to upward trend[1]>

(%)   (%)
— 2017
  2018

Quarter
0   4   8

<Loans granted when lending increases[2] rapidly>

(%)   (%)
— Average of 2015-16
-- Long-term average ('13-'19 excluding '15 and '16)

Quarter
0   4   8   12   16   20

<Loans granted when lending increases[2] slowly>

(%)   (%)
— Average of 2013, '14 and '19
-- Long-term average ('13-'19 excluding '13, '14 and '19)

Quarter
0   4   8   12   16   20

<New loans granted in 2020>

(%)   (%)
— 2020
-- Long-term average('13-'19)

Quarter
0   4   8

<Existing loans granted in 2013-19>

(%)   (%)
— Average of 2013-16
— Average of 2017-19
-- Long-term average ('13-'19)

Q1 19   Q1 20   Q4
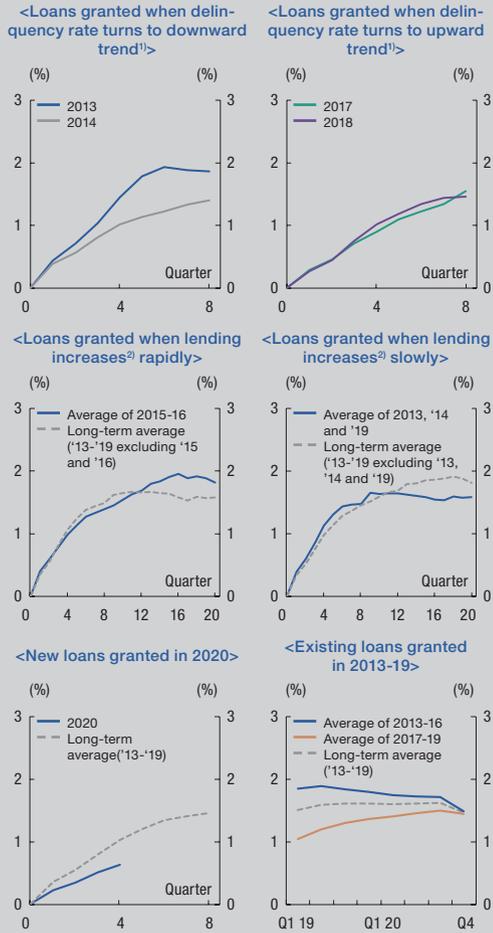
Notes: 1) When the delinquency rate of total household loans turns to downward (upward) trend.
2) When household lending increases rapidly (slowly).
Source: Bank of Korea staff calculation.

Status of vintage delinquency rate by sector after COVID-19

To conduct a more detailed examination of changes in vintage delinquency rates after the coronavirus outbreak, loans were classified ac-

cording to the characteristics of borrowers (type of lender, age, income level, etc.). The vintage delinquency rate curves for new loans granted in 2020 and existing loans (based on the long-term average rate of loans granted from 2013 to 2019) were compared by sector.

① By type of financial institution, non-bank borrowers had shown a higher delinquency rate than bank borrowers. The vintage delinquency rate of their new loans granted in 2020 was much lower than the long-term average, and the vintage delinquency rate of their loans granted from 2013 to 2019 has recently started to decline. This is attributed to the fact that non-bank financial institutions had more vulnerable borrowers than banks, who benefited directly or indirectly from the pandemic-related measures.

Vintage delinquency rate by financial institution sector

<Banks>

— 2020

<NBFIs>

-- Long-term average(13-19)

(%)   (%)
Quarter
0   4   8

(%)   (%)
Quarter
0   4   8

(%)   (%)
Q1 19   Q1 20   Q4

(%)   (%)
Q1 19   Q1 20   Q4
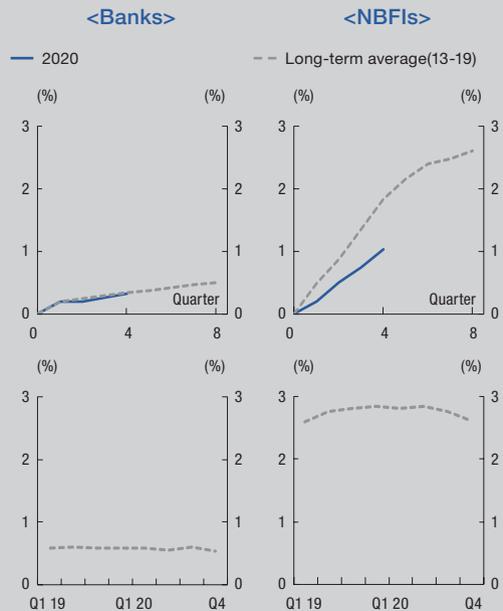
Source: Bank of Korea staff calculation.

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6) After the outbreak of COVID-19, the delinquency rate of total household loans fell by 0.2%p (1.1% at the end of the fourth quarter of 2019 → 0.9% at the end of the fourth quarter of 2020).

② By age group, overall, the vintage delinquency rate of loans received by younger borrowers tended to be lower than the long-term average. As for borrowers in their 20s and 30s, the vintage delinquency rate of new loans granted in 2020 was significantly lower than the long-term average, and the vintage delinquency rate of existing loans granted to this age group from 2013 to 2019 declined at a rate lower than that of other age groups. On the other hand, for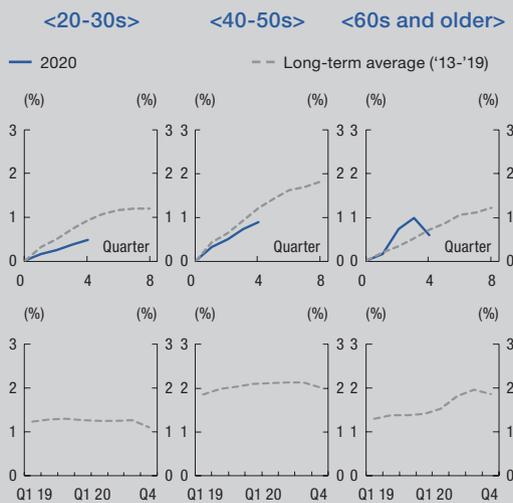 borrowers in their 60s, vintage curves for both new and existing loans rose steeply,[7] and only recently shifted to a negative trend.

term average rate curve, and the vintage delinquency rate curve for existing loans that originated from 2013 to 2019 also entered a downward trend after the COVID-19 outbreak. This trend was observed to be more prominent for the middle-income group, while for the low-income group, the vintage delinquency curves moved similarly, but the curve for existing loans granted from 2013 to 2019 showed a dramatic yet temporary increase before entering a decline.

Vintage delinquency rate by borrowers' age group

Source: Bank of Korea staff calculation.

Vintage delinquency rate by borrowers' income level[1]

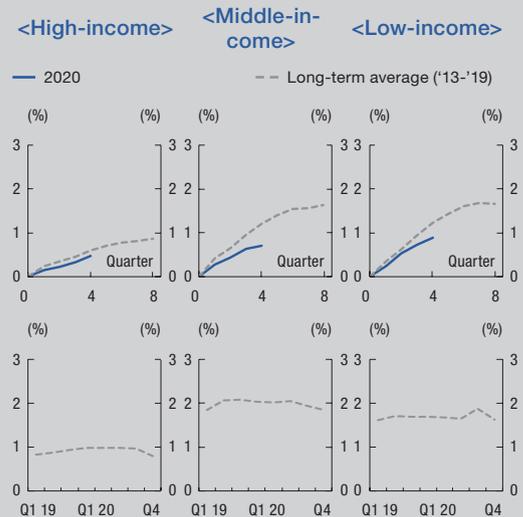Note: 1) High-income top 30%, middle-income 30-70%, low-income bottom 30%.
Source: Bank of Korea staff calculation.

③ By income level, in all income groups, the vintage delinquency rate curve for new loans that originated in 2020 moved below the long-

④ After the COVID-19 outbreak, the vintage delinquency rate curves for household loans for self-employed business owners (i.e., both new loans granted in 2020 and existing loans

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7) In particular, this movement of the vintage curve was more prominent among borrowers in their 70s and older than those in their 60s. For borrowers in their 70s, debt was four times greater than income (LTI: 378.4% at the end of the fourth quarter of 2020), which is well above the LTI ratio of other age groups (60s: 221.9%, 40-50s: 223.2%, 20-30s: 228.9%). Thus, their debt repayment capacity was definitely vulnerable, meaning income reduction may have a greater effect on loan delinquency. Furthermore, last year, the impact of COVID-19 in the early phase of the outbreak directly affected mostly those in their 70s and older. Public works projects, which accounted for the majority of jobs for the elderly, were interrupted because such work required contact among people. Later, when the spread of the pandemic moderated somewhat, those public works projects resumed after the third quarter, leading to significant income volatility among these vulnerable groups.

granted from 2013 to 2019) declined by a larger margin than those for general household loans for borrowers other than self-employed business owners. This is likely due to the fact that the government's policy measures in response to the coronavirus were focused on the self-employed and small business owners.

Vintage delinquency rate of self-employed business owners[1]
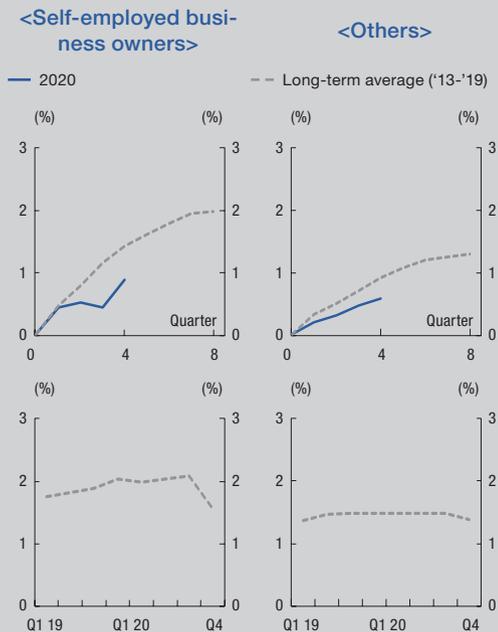
Note: 1) Household loans by borrowers with sole proprietor loans.
Source: Bank of Korea staff calculation.

Extent of potential default risks and path of delinquency rates

As examined above, since the outbreak of COVID-19, the vintage delinquency rates have declined significantly compared to their long-

term averages as a result of the direct and indirect impacts of the various emergency measures that were implemented, including interest rate cuts, although some of the effect was due to the rise in asset prices, leading to a downward movement of the delinquency rate of household loans as a whole.

Thus, to identify potential default risk that had not been emerged due to the various financial support measures related to the pandemic and predict the movement of the delinquency rate going forward, the delinquency rates during the 2020-2021 period that would have otherwise have been seen without the pandemic response measures were estimated[8] using the results of the vintage analysis above. The estimation results showed that, in 2020, the delinquency rate would have been 0.3 to 0.6%p higher than it currently is. Since this result was estimated under the proposition that the vintage delinquency rate curve returned to the level recorded prior to COVID-19 (long-term average rate for 2013 to 2019), it should be noted that if the credit risk had exceeded its long-term average level due to the pandemic, the estimated delinquency rate would have been higher.[9] Meanwhile, although it was estimated that the delinquency rate would continue rising at a slow pace in 2021, if the pandemic eases rapidly as the economy resurges with the rollout of vaccines, the debt repayment capacity of households will improve, and the credit risk will recede significantly. As a result, the estimated delinquency rate would likely decline to a lower level than expected. Still, because the uncertainty surrounding COVID-19

8) It was assumed that the vintage delinquency rate curve for loans that originated during the pandemic in 2020 returned to the long-term average level, and that the vintage curve for existing loans, which had moved downward as a result of the COVID-19 response measures, also normalized to the level seen prior to the pandemic. In addition, total loans were segmented according to the origination period, and the delinquency rate of total household loans was estimated in consideration of the vintage delinquency rate and share of total loans for each origination period. The delinquency rate estimated in this report is slightly different from delinquency rate compiled based on annual reports of financial institutions since 2012, but the two rates are nearly the same.

remains substantial and the delinquency rate is likely to climb upon the termination of the financial support measures, financial institutions need to actively guard against the possibility of a dramatic rise in non-performing loans by setting aside[10] loan loss provisions under stricter standards than the current delinquency rate would dictate. Particular attention needs to be paid to any increase in the delinquency rate for loans granted to non-bank borrowers, borrowers in their 20s and 30s, and self-employed business owners.

Estimated path of household loan delinquency rate using vintage delinquency rate

-- Delinquency rate of total household loans (based on financial institutions' business reports)[1]
— Delinquency rate of total household loans[2]
-- Estimated delinquency rate using vintage delinquency rate[3]
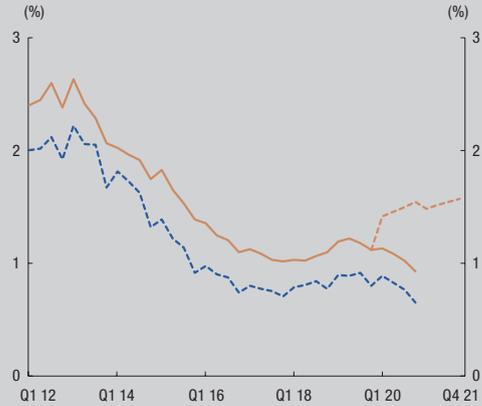
Notes: 1) Based on delinquency data of financial institutions (banks, mutual savings banks, credit-specialized financial cos., insurance cos., etc.) (delinquencies of one month and longer).
2) Based on delinquency data of NICE, a credit information service company (delinquencies of one month and longer).
3) Estimated quarterly on the assumption that the vintage curve for each year is restored to the long-term average ('13-'19) level.
Sources: Bank of Korea staff calculation, financial institutions' business reports.

9) The credit risk index of household loans extended by domestic banks (results of Loan Behavior of Financial Institutions, quarterly average) stood at 22 in 2020, amid COVID-19, up four points from the long-term average (18) for the period from 2013 to 2019. In addition, the credit risk index of loans granted by non-bank financial institutions (mutual savings banks, credit card companies, mutual credit cooperatives, and life insurance companies; weighted quarterly average of loan balance) was estimated at 25 in 2020, seven points higher than the long-term average (18: 2013 to 2019). Referring to the relationship between the credit risk index and household debt delinquency rate observed during the period from 2013 to 2019, the estimated delinquency rate for 2020 is expected to rise by about 0.1%p, owing to the increased credit risk related to the pandemic (e.g., regression coefficient of estimated model (0.0118) multiplied by the further rise (6) of the index above the long-term average for 2013 to 2019).

Model to estimate household loan delinquency rate, considering credit risk index

Explanatory variable	Credit risk index	Base rate	Household credit growth rate	Housing purchase price index	KOSPI index	Constant term
Regression coefficient	0.0118***	0.4146***	-0.0206*	-0.0515***	-0.0002*	5.8744***
(p-value)	(0.0003)	(0.0000)	(0.0669)	(0.0000)	(0.0722)	(0.0000)

Notes: 1) ***, **, and * refer to significance levels of 1%, 5%, and 10%, respectively.
2) Analysis period was from the first quarter of 2009 to the fourth quarter of 2019

10) According to the BIS (May 2021), large banks worldwide preemptively set aside loan loss provisions to cope with the impending credit risk surge amid COVID-19, while they also saw an increase in net profits due to the expansion of loans after the COVID-19 outbreak. Korean financial institutions need to take this into account in assessing the feasibility of additional provisioning.

Box 2.

Recent Status of the Unsecured Household Loan Market and Implications

Unsecured household loans of domestic financial institutions are loans that are based on the borrower's credit without collateral, such as general unsecured loans, card loans, and cash advances. These loans have recently shown rapid growth. Hereunder, the recent status of the unsecured household loan market is reviewed, and its implications are derived.

Status

As of the end of March 2021, the value of unsecured household loans amounted to KRW 304.7 trillion, accounting for 18.3% of total household loans. By financial sector, unsecured loans of banks reached KRW 187.8 trillion, or 61.6% of total unsecured household loans, and unsecured loans of credit-specialized financial companies amounted to KRW 51.4 trillion, or 16.9% of the total. The value of unsecured loans extended by financial institutions was as follows: mutual credit cooperatives, KRW 29.8 trillion (9.8%); savings banks, KRW 22.0 trillion (7.2%); private money lenders, KRW 6.8 trillion (2.2%); and insurance companies, KRW 6.8 trillion (2.2%). By level of borrower creditworthiness,[1] the number of borrowers with high credit ratings accounted for 54.3% of the total, representing 64.2% of the total loan value. The number of borrowers with low and middle credit ratings accounted for 45.7%, but the value of their loans

represented only 35.8% of the total. Banks issued loans primarily to borrowers with high credit ratings (84.0%), while non-bank financial institutions extended loans mostly to borrowers with middle credit ratings (56.9%).

Unsecured household loans[1] by sector

Percentage[1] of unsecured household loans by creditworthiness and sector
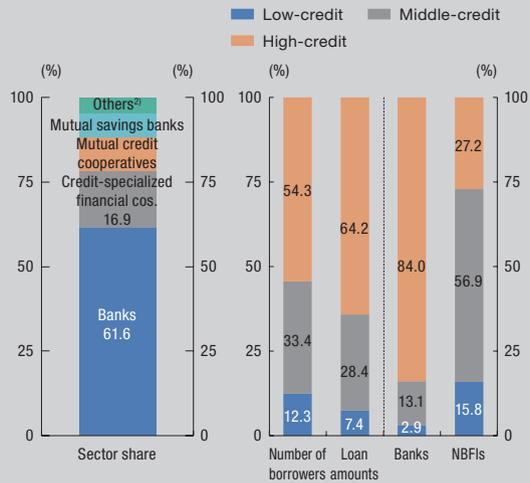
Notes: 1) Basis of end-March 2021 (estimation of private money lenders).
2) Private money lenders and insurance companies.
Sources: Bank of Korea (Consumer Credit Panel), financial institutions' business reports, actual condition surveys of private money lenders.

Since 2017, unsecured household loans have grown by an annual average rate of 10.5%, far exceeding the pace of total household loan growth (6.6%). In particular, during 2020, unsecured household loans surged by 15.2%, driven mostly by loans from banks, recording the highest growth in the past 10 years.

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1) For details on the classification of borrowers into low, middle, and high credit ratings, refer to footnote 7 in "Financial Stability Situation," Ⅰ. Credit Markets 2. Household Credit" (page 24).

Domestic unsecured household loans trends

Growth rate[1] of unsecured household loans by sector
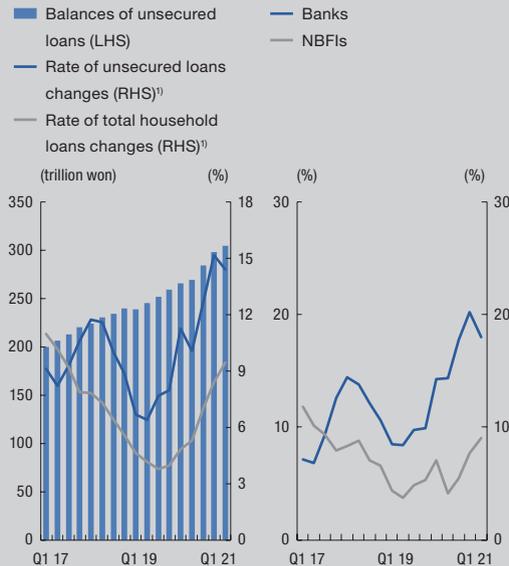
- ■ Balances of unsecured loans (LHS)
- ▬ Rate of unsecured loans changes (RHS)[1]
- ▬ Rate of total household loans changes (RHS)[1]

- ▬ Banks
- ▬ NBFIs

Notes: 1) Year-on-year basis.

Sources: Financial institutions' business reports, actual condition surveys of private money lenders.

Major characteristics

(Significant increase in bank loans to borrowers with high credit ratings)

The growth of unsecured household loans is driven mostly by the increase in loans to borrowers with high credit ratings. Such loans have increased by an annual average rate of 13.3% since 2017, while loans to borrowers with middle credit ratings have risen by 5.7% and

loans to borrowers with low credit ratings have decreased by 3.7%.[2] This occurred partly because a significant share of borrowers with low and middle credit ratings rose to the status of borrowers with high credit ratings thanks to the improvement of borrowing conditions caused by the continued trend of low interest rates.[3] In addition to this increase in borrowers with high credit ratings, the per-capita loan balance rose as well. Looking at the trend of per-capita loan value since 2017, borrowers with high credit ratings increased by 43.7%, whereas borrowers with low credit ratings rose by only 6.9%.

Growth rate[1] of unsecured household loans by borrower's creditworthiness

Changes of unsecured household loans per person by borrower's credit worthiness

- ▬ Low-credit
- ▬ Middle-credit
- ▬ High-credit

- ■ End of 2016
- ■ End-March 2021
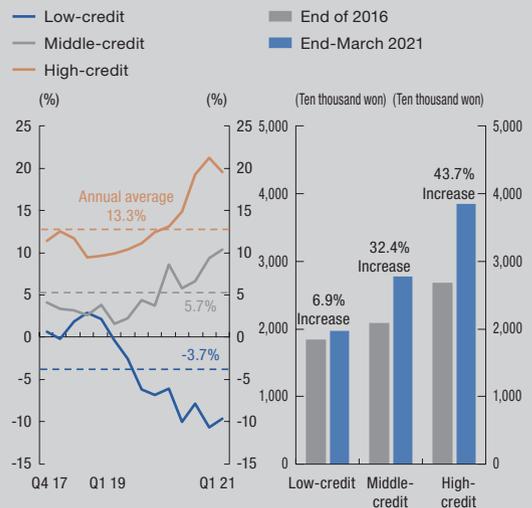
Note: 1) Year-on-year basis.

Source: Bank of Korea (Consumer Credit Panel).

2) This is also happening in the United States. From 2017 to 2020, the total loan amount (inflation-adjusted) of borrowers with prime credit scores surged by 18%, thanks to the increase in the number of borrowers, while loans for borrowers with near-prime credit scores was flat and loans for those with subprime credit scores declined slightly (US Federal Reserve Board Financial Stability Report, May 2021).

3) Analysis of the Consumer Credit Panel database showed that, among borrowers of unsecured household loans (based on balances of general unsecured loans, card loans, and cash advances and credit limits of checking accounts with overdraft lines of credit), about 5.0% of borrowers with low credit ratings and 22.8% of borrowers with middle credit ratings listed as of the end 2016 had moved to the status of borrowers with high credit ratings by the end of March 2021, leading the number of borrowers with high credit ratings to rise by an annual average rate of 4.1% from the end of 2016. The numbers of borrowers with middle credit ratings and borrowers with low credit ratings have decreased by annual average rates of 1.0% and 5.2%, respectively, since 2017.

Meanwhile, driven by the increase in loans to borrowers with high credit ratings extended mostly by banks, the share of banks among loans to borrowers with high credit ratings edged up from 83.0% at the end of 2016 to 85.2% at the end of March 2021. Non-bank financial institutions saw their growth rate of loans fall short of that of banks, and their market share slide from 17.0% at the end of 2016 to 14.8% at the end of March 2021.

In particular, in 2020, loans granted to borrowers with high credit ratings rose to 21.2%, showing a rate of increase significantly higher than that of typical years (annual average rate of 11.2% from 2017 to 2019), and most of these loans seem to have been invested in assets such as housing and stocks. The reason for this is likely that, in 2020, unsecured loans to borrowers with high credit ratings increased dramatically in areas where housing prices rose consider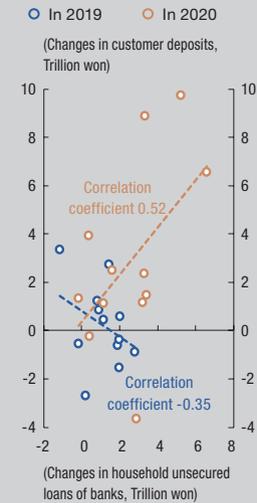ably,[4] and the balance of investor's deposits with securities companies climbed in tandem with the increase in unsecured household loans granted by banks in 2020.

Housing price growth rate by region[1] and growth rate of unsecured loans for borrowers with high credit ratings
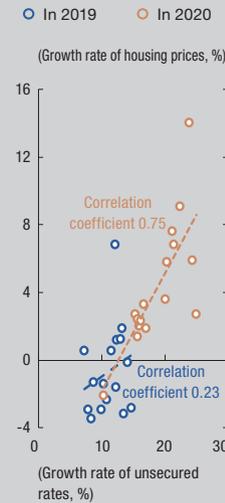
Changes[2] in customer deposits with securities companies and unsecured loans for banks

○ In 2019   ○ In 2020

(Growth rate of housing prices, %)

Correlation coefficient 0.75

Correlation coefficient 0.23

(Growth rate of unsecured rates, %)

○ In 2019   ○ In 2020

(Changes in customer deposits, Trillion won)

Correlation coefficient 0.52

Correlation coefficient -0.35

(Changes in household unsecured loans of banks, Trillion won)

Notes: 1) Based on 16 cities (except Sejong City).
2) Based on monthly changes.
Sources: Bank of Korea (Consumer Credit Panel), financial institutions' business reports, Korea Real Estate Board, Korea Financial Investment Association.

(Persistent interest rate discontinuity despite an increase in loans to borrowers with middle credit ratings)

Loans extended to borrowers with middle credit ratings, which have increased by an annual average rate of 5.7% since 2017, are growing mostly for non-bank financial institutions (7.6%), led by savings banks (25.8%) and credit-specialized financial companies (8.4%).[5] On the other

4) The correlation coefficient between the housing price growth rate by region and the growth rate of unsecured loans for borrowers with high credit ratings increased from 0.23 in 2019 to 0.75 in 2020. Meanwhile, the correlation coefficient between the housing price growth rate and growth rate of unsecured loans for borrowers with low and middle credit ratings stood at -0.14 in 2020.

5) Savings banks significantly increased their unsecured loans (up by an annual average of 23.9% since 2017) amid the contraction of home mortgage loans caused by increasingly stringent regulations and the financial authorities' policy to expand middle-interest-rate loans. Credit-specialized financial companies continuously expanded their unsecured household loans such as card loans (up 8.3% annually) to increase profits in the face of intensifying competition between payment instruments amid the growth of simple payment services and reduction of fees charged for merchants.

hand, loans granted to borrowers with middle credit ratings by banks climbed by an annual average rate of only 1.9%, showing relatively slower growth. As a result, non-bank financial institutions accounted for 69.9% of loans to borrowers with middle credit ratings as of the end of March 2021, up from 64.8% at the end of 2016, while the figure for banks dropped from 35.2% to 30.1% over the same time period.

above 14% were higher, while the share of loans with interest rates of around 7% to 13% was low, showing a curve with two peaks.

Growth rates[1] of unsecured household loans in borrowers with middle credit ratings by sector

Shares of loan market by sector in borrowers with middle credit ratings

- Banks
- NBFIs
- Credit-specialized financial cos.
- Mutual savings banks
- Total

- Banks
- NBFIs
- Credit-specialized financial cos.
- Mutual savings banks

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

Percentage[1] amount of loans by interest rate level of unsecured household loans

Percentage[1] amount of loans by sector and interest rate level

- Banks
- Mutual credit cooperatives
- Credit-specialized financial cos.
- Mutual savings banks
- Sum of major institutions

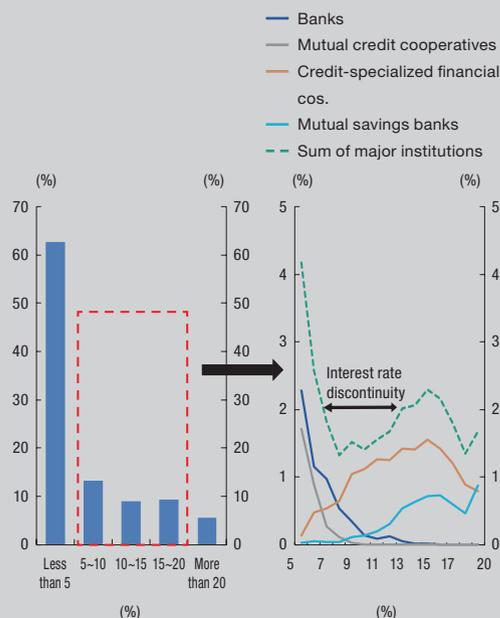Notes: 1) Based on end of March 2021; in the case of credit-specialized financial companies, the estimation is based on the survey table of 5 credit card companies 3 capital companies (70% of total credit-specialized financial companies loans); in the case of mutual credit cooperatives, MG community credit cooperatives are excluded; in case of private money lenders, loans are included in 20% or more; in the case of insurance companies, estimates made using the amount of new handling in March 2021.
Sources: Financial institutions' business reports, surveys of financial institutions, actual condition surveys of private money lenders, associations.

Meanwhile, the interest rate discontinuity that has emerged as a structural problem in the domestic unsecured loan market[6] is still observed in loans with interest rates of around 7% to 13% to borrowers with middle credit ratings. Regarding the share of loans by interest rate level, the shares of loans with interest rates below 6% or

The interest rate discontinuity persisted owing to the lack of a financial sector and products specialized in such interest rate level. Banks have less incentive[7] to increase their loans to borrowers with middle credit ratings amid strong demand for loans to borrowers with high credit

6) Due to the lack of loan products offering interest rates of 7% to 13% per annum, some borrowers with middle credit ratings, who can access banks and mutual credit cooperatives, pay interest rates as low as around 5%, and other borrowers who do not have such access are likely to pay higher rates (about 15%).

ratings, while mutual credit cooperatives focus on loans to borrowers with high credit ratings or secured loans with collateral to reduce their risk burden. Meanwhile, regarding credit-specialized financial companies and savings banks, the overall loan interest rate has been falling amid the low interest rate trend, the reduction of the legal maximum interest rate (February 2018), and the government policy to promote medium interest rate loans, with the number of borrowers with middle credit ratings on the rise. Despite these changes, however, because some lenders credit scoring systems have not been developed to a sufficient level of sophistication, it would likely be difficult to correct the tendency of lenders to focus on[8] borrowers with middle credit ratings and lower credit scores or borrowers with low credit ratings.

Changes[1] in percentage of loan balances by sector and interest rate section
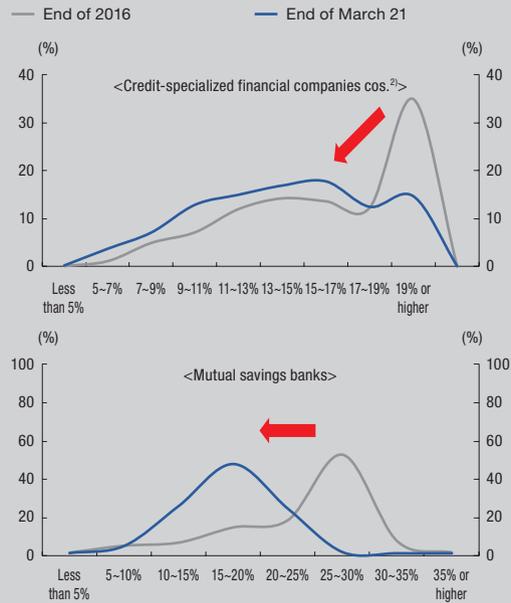
Notes: 1) Based on loan amounts.
2) Estimation based on the survey table of 5 credit card companies and 3 capital companies.
Source: Financial institutions' business reports, surveys of financial institutions.

(Contraction of loan market for borrowers with low credit ratings)

The loan market for borrowers with low credit ratings has contracted by an annual average rate of 3.7% since 2017 due to the significant contraction of the number of borrowers, unlike loans for borrowers with middle and high credit ratings.[9] In particular, loans extended by private money lenders, one of the major lenders to borrowers with low credit ratings, have fallen

7) Internet-only banks that were launched with the aim of expanding medium-interest-rate loans are also focusing on loans for borrowers with high credit ratings. Loans granted to borrowers with high credit ratings by Internet-only banks made up 83.8% of all new unsecured loans that originated during the first quarter of 2021, which is well above the 71.7% recorded for nationwide banks.

8) As of the end of March 2021, 66.3% of the balance of loans originated by credit-specialized financial companies and 84.7% of the balance of loans originated by savings banks were granted to borrowers with credit scores in the bottom 30%. In fact, some savings banks charged the same interest rate for borrowers with Grades 4 to 6 under the old credit rating system or the legal maximum interest rate regardless of credit score assessed by credit rating companies (press release by Financial Services Commission in April 2021).

by an annual average rate of 12.7% since 2017. This seems likely to be attributed to private money lenders shifting their business focus from low-credit to middle-credit borrowers in a bid to reduce their loan costs, such as write-off costs, in connection with the cuts made to the legal maximum interest rate in March 2016 and February 2018.[10] In this process, credit-specialized financial companies and savings banks are absorbing part of the demand for loans to borrowers with low credit ratings. As a result, the share of private money lenders in the loan market for borrowers with low credit ratings has fallen (24.1% at the end of 2016 → 15.8% at the end of March 2021), whereas the share of credit-specialized financial companies and savings banks in that market has climbed (25.5% → 31.7% and 11.6% → 15.0%, respectively, for the same period).

Growth rate[1] of unsecured household loans by sector of borrowers with low credit ratings

- Banks
- NBFIs
- Loan business
- Total

Share by sector of borrowers with low credit ratings in loan markets

- Banks
- Loan business
- Credit-specialized financial cos.
- Mutual savings banks
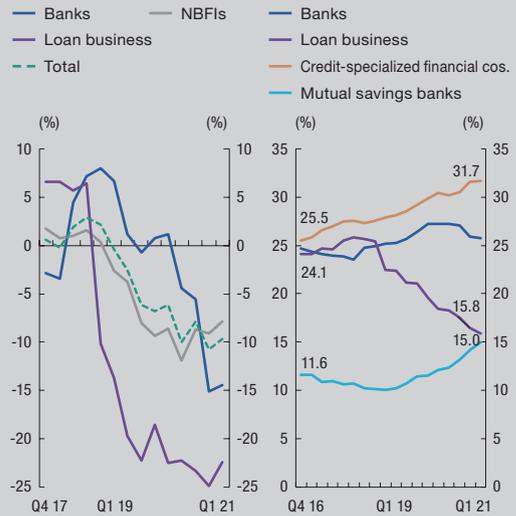
Note: 1) Year-on-year basis.
Sources: Bank of Korea (Consumer Credit Panel).

The loan market for borrowers with low credit ratings could shrink further due to the reduction of the legal maximum interest rate slated for July this year. As of the end of 2020, loans extended by private money lenders with a loan-to-cost ratio of over 15% make up half of all loans. Considering that the majority of interest rates of unsecured loans by private money lenders are around the legal maximum interest rate (24%), private money lenders that expect to find it difficult to secure reasonable margins in the coming event of a cut of the legal maximum interest rate (24% → 20%) are more likely to curb loans to borrowers with low credit ratings.

9) The number of borrowers with low credit ratings has decreased by an annual average rate of 5.2% since 2017. The per-capita loan amount for borrowers whose credit ratings were downgraded from middle or high to low (KRW 26.70 million at the end of March 2021) was larger than that for borrowers whose credit ratings were upgraded from low to middle or high (KRW 17.92 million at the end of 2016), which helped constrain the decline of loans for borrowers with low credit ratings. Meanwhile, loans for borrowers with low credit ratings whose ratings remained unchanged have decreased by an annual average rate of 10.3% since 2017.

10) Some large private money lenders mostly owned by Japanese capital lenders have suspended the issuance of new loans (Sanwa Money, Joy Credit Co., Ltd., etc.), while others have withdrawn from the private money lending business by acquiring savings banks (Apro Financial, Welcome Creditline, etc.).

Policy authorities are coping with the contraction of loans for borrowers with low credit ratings in the unsecured loan market by offering financial products[11] for lower income household. It was found that borrowers with low credit ratings taking loans from banks are more likely to see their credit ratings improve than those who receive loans from private money lenders. Borrowers whose credit scores improved over the period from 2017 to March 2021 held a higher share of loans from banks and a lower share of loans from private money lenders at the end of June 2016, compared with borrowers whose credit scores had not improved. Analysis has shown that the financial products for lower income household offered by banks contributed to the improvement of debt repayment capacities as the interest rates of these financial products are well below the rates charged by private money lenders.

Loan cost ratios[2] in 2020, major loan companies[1]
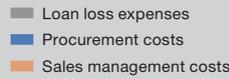
Loan amounts at the end of 2016 by credit score improvement status

- Loan loss expenses
- Procurement costs
- Sales management costs
- Banks
- NBFIs
- Loan companies
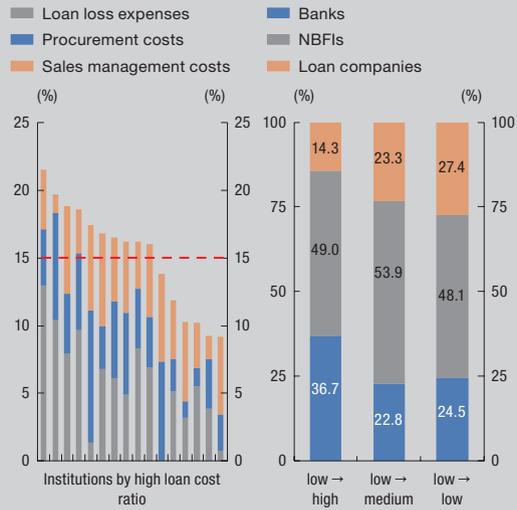
Notes: 1) Based on top 15 companies in terms of loan amount.
2) Procurement costs, loan loss expenses, sales management costs compared to monthly average balance basis of loan amounts.

Sources: Bank of Korea (Consumer Credit Panel), loan company audit reports.

Implications

The recent dramatic increase in unsecured household loans mostly to borrowers with high credit ratings may be a positive development in terms of the soundness of financial institutions, but constant vigilance is needed against the possibility that the structural quality of household debt may deteriorate because the rapid increase in unsecured loans, most of which have shorter maturities[12] and floating interest rates,[13] means

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11) Such loan products were offered to secure access to financial services for vulnerable people. Major products include the "New Hope Spore Loan," which uses banks' own funds (interest rate: up to 10.5%, with domestic banks supplying KRW 3.7 trillion worth of this loan in 2020).

12) The shares of loans of domestic banks by remaining maturity at the end of 2021 are as follows:

	6 months or less	6 months to 1 year	1-3 years	3 or more years
Unsecured loans	41.9%	42.5%	8.3%	7.4%
Home mortgage loans	6.8%	10.0%	22.6%	60.6%

13) At the end of March 2021, unsecured household loans with floating interest rates issued by domestic banks accounted for 77.7% of total loans, well above that for mortgage loans with floating rates (61.7%).

that borrowers' debt repayment capacities are greatly affected by changes in financial market conditions such as interest rates. Furthermore, a significant portion of unsecured loans to borrowers with high credit ratings is being invested in assets, which may contribute to the deepening of the financial imbalance.

Meanwhile, to address the persistent interest rate discontinuity in the unsecured household loan market, competition must be promoted between financial sectors in terms of medium-interest-rate loans offering interest rates near the interest rate fault and address[14] the information asymmetry between financial institutions and borrowers. Furthermore, policy authorities are also advised to make efforts to strengthen financial accessibility through the use of special purpose financial products so that the availability of funds to borrowers with low credit ratings is not affected by the contraction of the loan supply from financial institutions resulting from the reduction of the legal maximum interest rate.

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14) Efforts should be made to improve information asymmetry, such as establishing a platform to expand financial consumers' choices across a variety of loan products and improving the risk assessment method for thin filers (Financial Services Commission, "Ways of Improving the Medium-interest-rate Loan System," April 2021).

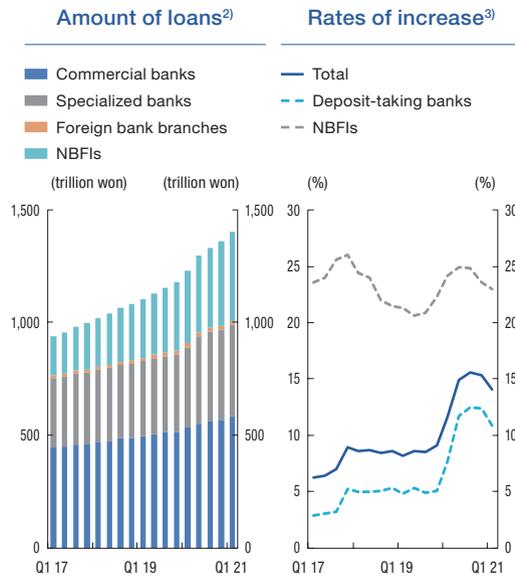# 3. Corporate Credit

Continued growth in corporate credit

Corporate loans by financial institutions continued on a steep upward trend to jump 14.1% year on year to KRW 1,402.2 trillion at the end of the first quarter of 2021. In spite of a slight slowdown since the second half of last year, the pace of growth in corporate loans still remains significantly faster than in the past amid the ongoing COVID-19 crisis, due to both increased working capital needs and pandemic lending programs by the government.[8]

By type of financial institution, corporate loans from both deposit-taking banks and NBFIs grew at an accelerated rate. At the end of the first quarter of 2021, corporate loans by deposit-taking banks reached KRW 1,006.6 trillion (KRW 582.2 trillion in commercial bank loans, KRW 407.2 trillion in loans by specialized banks), which represents a year-on-year increase of 10.9% (9.3% for commercial banks, 14.2% for special banks). Corporate loans by NBFIs[9] logged hefty year-on-year growth of 23.0% to hit KRW 395.6 trillion,[10]

driven by brisk lending by mutual credit cooperatives (Figure Ⅰ-13).

Figure Ⅰ-13. Corporate loans of financial institutions[1]

Amount of loans[2]		Rates of increase[3]
■ Commercial banks		— Total
■ Specialized banks		– – Deposit-taking banks
■ Foreign bank branches		– – NBFIs
■ NBFIs		

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.

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8) In March 2021, the government extended its loan forbearance program for SMEs and small businesses for six more months until September 2021. In May, the government followed up with the announcement of measures to mitigate the impact of a drop in credit ratings on SMEs and small businesses, which included new credit rating guidelines that take into account a borrower's potential for improvement in their financial position and minimize the negative effect of a lower credit rating on lending terms. In March 2021, the BOK also extended its relief program for COVID-19-impacted businesses until September 2021.

9) Corporate loans by NBFIs are based on loans issued to non-bank financial corporations by mutual savings banks, mutual credit cooperatives (Nonghyup, Suhyup, Forestry Cooperatives, Shinhyup, and MG Community Credit Cooperatives), insurance companies (life insurance and general insurance companies), and credit-specialized financial companies (credit card and installment finance companies). However, due to limited data availability, some sectors' data include loans to financial and insurance companies.

10) By type of financial institution, this amount breaks down to KRW 215.4 trillion for mutual credit cooperatives (54.5% of total corporate loans by all NBFIs), KRW 91.6 trillion for insurance companies (23.1%), KRW 51.1 trillion for credit-specialized financial companies (12.9%), and KRW 37.4 trillion for mutual savings banks (9.5%).

By company size,[11] loans to SMEs grew at a particularly fast rate. While growth slowed in loans to large enterprises (KRW 205.7 trillion, year-on-year growth of 5.4%) amid a sharp increase in direct financing, growth in SME loans (KRW 1,193.4 trillion, year-on-year growth of 16.3%) further gathered pace on higher working capital needs (small and medium-sized corporations: KRW 655.0 trillion, 16.9%; sole proprietors: KRW 538.4 trillion, 15.4%) (Figure Ⅰ-14).

Figure Ⅰ-14. Corporate loans[1)2)3)], by company size
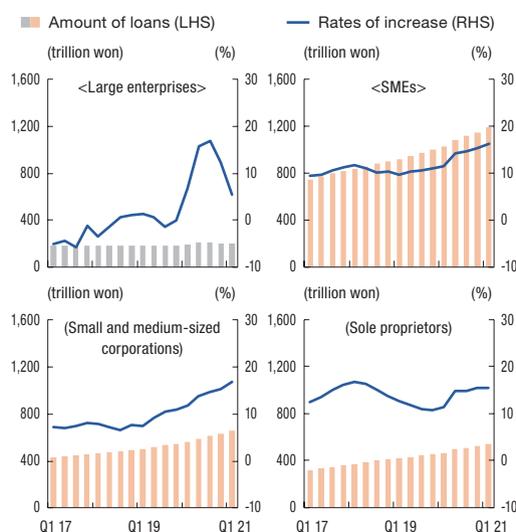
Notes: 1) Based on sum of banks and NBFIs.
　　　2) End-period basis (excluding financial and insurance companies); rates of increase are year-on-year basis.
　　　3) "Small and medium-sized corporations" refers to SMEs other than sole proprietors.
Sources: Financial institutions' business reports.

By industry,[12] the rate of loan growth sharply accelerated across all industry segments, with a particularly fast rate recorded in air trans-

port, shipping, and accommodation & food services (Figure Ⅰ-15).

Figure Ⅰ-15. Growth rates[1)] of financial institutions' corporate loans, by industry
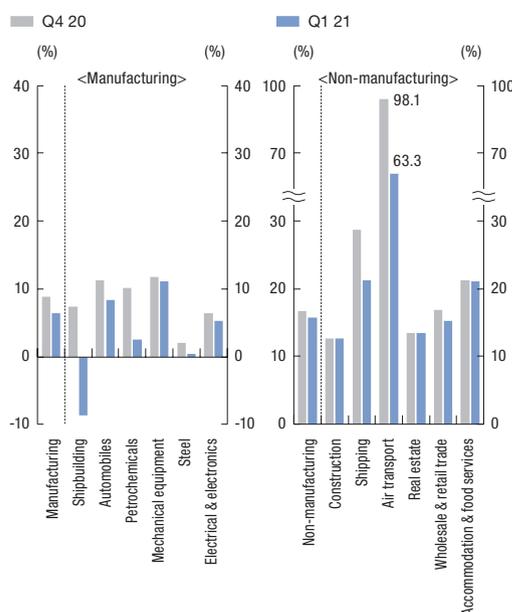
Note: 1) Year on year basis.
Sources: Financial institutions' business reports.

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

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11) Due to limited availability of data, some NBFI loans (insurance policy loans) that could not be classified by company size were excluded from this analysis.

12) The analysis excluded corporate loans by some types of institutions (mutual savings banks and credit-specialized financial companies) due to the data not being classified by industry.

Figure Ⅰ-16. Corporate bond and commercial paper (CP) issuance[1]

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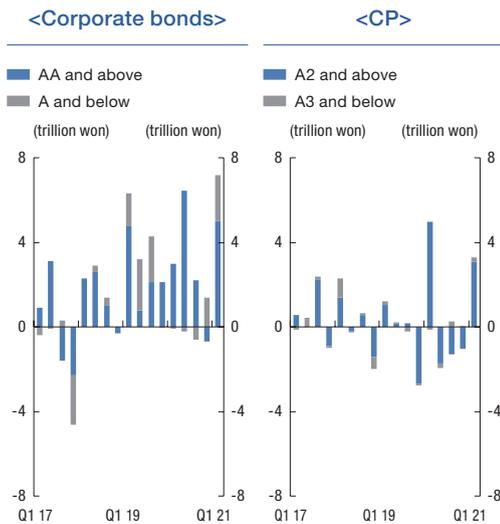
Note: 1) Excluding issuance by financial holding companies and special purpose companies (SPCs); net-issuance basis.
Sources: Bank of Korea, Korea Securities Depository, Korea Credit Information Services.

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

Debt ratios	Shares of corporations[2] with ratios above 200%

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

Drop in debt ratios

The overall corporate[13] debt ratio (debt / equity), which had been lifted by increased borrowing to 81.1% at the end of June 2020 from 78.6% at the end of 2019, dropped to 77.2% at the end of 2020 due to capital expansion. However, the share of firms with a debt ratio above 200% (excessively indebted firms) showed an increase (15.3%) from the end of the first half of 2019 (12.4%)[14] (Figure Ⅰ-17).

Reduced erosion of growth and profitability

In 2020, while corporate sales moved further into negative territory (compared to a year earlier) to -5.0% from -2.0% in 2019, this trend slowed gradually 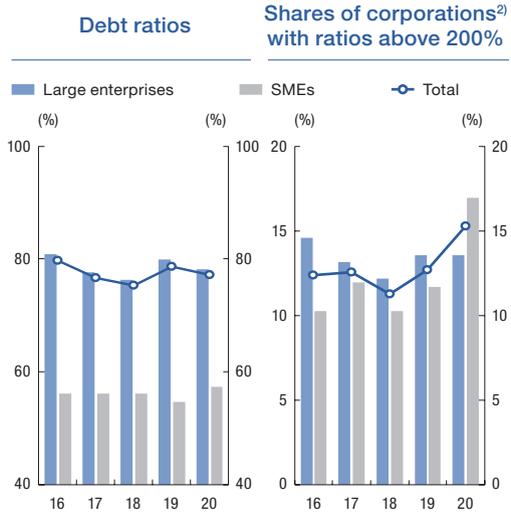once into the second half (-7.0% in the first half, -3.4% in the second half). By company size, while the rate of positive sales growth accelerated among SMEs (1.7% → 3.3%)[15] compared to the previous year, negative momentum gained pace among

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13) Hereafter based on 2,520 firms (1,276 large enterprises, 1,244 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.

14) By size of company, the share of excessively indebted firms remained unchanged from the end of the first half of 2019 for large enterprises (13.6% → 13.6%), while it increased considerably for SMEs (11.2% → 17.0%) over the same period.

15) By sector, sales growth was driven primarily by the medical and chemical industry (56.7%), information services (13.4%), and machinery & equipment (6.5%) buoyed by higher demand and changing consumption behavior. By period, sales growth recorded at 1.9% during the first half and accelerated to 5.6% during the second half.

large enterprises (-2.1% → -5.2%).[16]

In spite of this slip in sales, the operating income-to-sales ratio (operating income / sales), a measure of corporate profitability, improved (4.4% in 2019 → 5.0% in 2020) thanks to efforts to cut costs on the part of firms.[17] By period, the operating income-to-sales ratio, which stood at 4.2% in the first half, rose to 5.8% in the second half.

By company size, the operating income-to-sales ratio edged higher for both large enterprises (4.5% → 5.0%) and SMEs (2.6% → 3.8%), compared to the previous year (Figure Ⅰ-18).

Figure Ⅰ-18. Sales growth rates[1] and operating income-to-sales ratios,[2] by company size
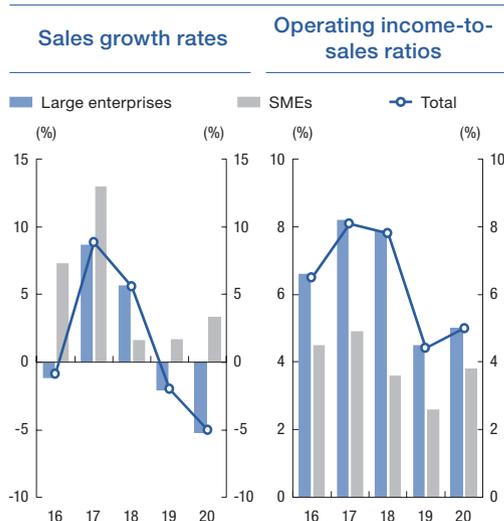
Notes: 1) Year on year basis.
2) Operating income / Sales.
Source: KIS-Value.

Slightly higher interest coverage ratio

In 2020, the interest coverage ratio[18] (operating income / total interest expense), measuring a company's ability to pay the interest on its outstanding debt, inched slightly higher from 2019 (4.1) to 4.6.[19] After being dragged down below the previous year's level (3.4) during the first half of 2020 by tumbling operating income, the interest coverage ratio recovered during the second half of 2020 (5.4) on the upturn in some industry sectors. By company size, the interest coverage ratio improved both

16) By sector, sales plummeted in industries that were heavily impacted by the COVID-19 pandemic, such as air transport (-44.3%), accommodation & food services (-35.4%), and petrochemicals (-21.7%). By period, a sharp decline in sales (-7.3%) during the first half was followed by a more moderate drop of -3.6% in the second half.

17) In 2020, the cost of sales ratio (total costs of goods / total sales) stood at 79.8%, a slight decrease from the level a year earlier (81.2%).

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

19) When high-performing sectors (electrical & electronics, medical, and chemical industries) were excluded, this figure was significantly lower, standing at 2.9 at the end of 2020, a decrease from 2019 (3.3).

among large enterprises (4.3 → 4.8) and SMEs (1.0 → 1.6) from the level a year earlier.

However, the proportion of firms with an interest coverage ratio less than 1 increased from 35.1% in 2019 to 39.7% in 2020. Over half of all SMEs (47.0% → 50.9%) appear to be unable to pay their interest expenses from operating income. The share of vulnerable firms with a low interest payment capacity also rose from a year earlier among large enterprises (23.6% → 28.8%)[20] (Figure Ⅰ-19).

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

Interest coverage ratios

Shares of corporations[2] with ratios below 1
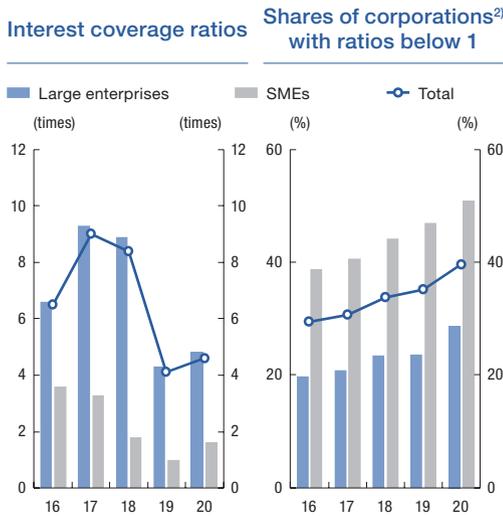
Notes: 1) Operating income / Total interest expenses.
2) Including corporations recording operating losses.
Source: KIS-Value.

Meanwhile, even as the financial soundness of the overall corporate sector has improved, the disparity between firms has only widened. Although the delinquency rate on corporate loans still remains quite low, attention must be paid to the possibility of a delay in the im-

provement of corporate earnings leading to the materialization of latent credit risk, starting with loans to vulnerable firm.

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20) For details, refer to <Analysis of Financial Stability Issues> 「IV. The Rise of Vulnerable Firms with Low Interest Coverage Ratios in Korea: Background and Implications」(page 165).

Box 3 .

The lending of the Self-Employed After the COVID-19 Outbreak and Implications

After the outbreak of COVID-19, loans granted to self-employed business owners (hereafter, "SEBOs") increased significantly.[1] Hereunder, using the Bank of Korea Consumer Credit Panel,[2] the status of loans extended to SEBOs is examined, and implications are derived.

Current status of SEBOs loans

At the end of March 2021, the outstanding amount of SEBOs loans stood at KRW 831.8 trillion (for 2.456 million borrowers), among which sole proprietor loans reached KRW 541.0 trillion, and household loans recorded KRW 290.8 trillion.[3] The value of loans granted to SEBOs accounted for 59.5% of the total value of corporate loans, 49.9% of the total value of household loans, and 27.1% of the sum of corporate loans and household loans (KRW 3,065.1 trillion).

Status[1] of loans granted to SEBOs
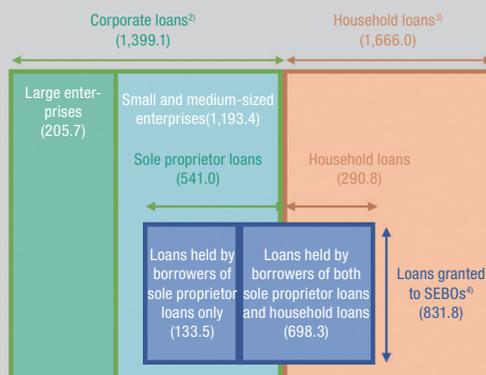
Notes: 1) Loan amounts as of end-March 2021; figures within parentheses are in trillion won.
2) Sum of loans from banks and NBFIs (excluding some loans from insurance companies).
3) Household credit statistics basis (excluding merchandise credits).
4) Bank of Korea Consumer Credit Panel basis.
Sources: Bank of Korea, financial institutions' business reports.

After the COVID-19 pandemic started, loans to SEBOs steadily increased at a much higher rate than household loans. By business type, loans to the retail and wholesale trade, accommodation and food service, and leisure service sectors, in which sales were hit hard by the pandemic, rose substantially. As a result, the share of loans to the wholesale and retail trade (Q1 2020: 11.4% → Q1 2021: 12.2%) and accommodation and food service sectors (7.7% → 7.9%) rose, while the share of loans to the real estate sector declined (38.9% → 34.8%).

1) Since the Consumer Credit Panel was first compiled in 2012, loans extended to SEBOs have reached a record high in terms of total value and growth rate (total value of loans: KRW 831.8 trillion, growth rate: 18.8%, at the end of the first quarter of 2021).

2) 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 the household loans and sole proprietor loans held by them was recognized as loans to SEBOs.

3) Loans held by borrowers of both sole proprietor loans and household loans stood at KRW 698.3 trillion, accounting for 84.0% of total loans to SEBOs (KRW 831.8 trillion).

Rates of increase[1] in loans to SEBOs

- Amounts of loans (LHS)
- Rates of increase (RHS)
- Rates of increase in household loans (RHS)[2]

(trillion won)   (%)

831.8
18.8
9.5

Q1 20 Q2 Q3 Q4 Q1 21

Rates of increase[1] by industry

- Q1 20
- Q2 20
- Q3 20
- Q4 20
- Q1 21

(%)   (%)

24.2
18.6
3.5
31.2

Wholesale & retail trade
Accommodation & food service
Real estate
Leisure service

Rates of increase[1] in loans to SEBOs, by income quintile

- Q1 20
- Q2 20
- Q3 20
- Q4 20
- Q1 21

(%)   (%)

First Second Third Fourth Fifth

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

Notes: 1) Year-on-year basis.
    2) Household credit statistics basis (excluding merchandise credits).
Source: Bank of Korea (Consumer Credit Panel).

By income quintile, low-income self-employed borrowers appeared to be more vulnerable to the effects of the coronavirus pandemic. Since the COVID-19 outbreak, loans to low-income borrowers (first and second quintiles) soared by a large margin, showing a rate of growth higher than other income quintiles.

By region, in the Seoul metropolitan area, where social distancing has been strictly observed for a protracted period of time, loans of SEBOs have grown at an increasing pace. In addition, in Gangwon and Jeju provinces, which are more reliant on the tourism industry, loans of SEBOs climbed by a large margin at the beginning of the pandemic, with the pace of growth gradually slowing later. Regarding self-employed borrowers by gender, as the impact of COVID-19 on sales was concentrated in the service sectors that require contact with customers, loans of female SEBOs, who accounted for the larger share of service sector workers, rose significantly.

Rates of increase[1] in loans to SEBOs

By region   By gender

Q1 20   Q2 20   Q3 20   Q4 20   Q1 21

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

Meanwhile, due to the pandemic, the number of new borrowers has risen significantly since the second quarter of 2020, and the proportion of loans extended to new self-employed borrowers among all loans to SEBOs increased as well.

Number of new self-employed borrowers[1]   Share of new self-employed borrowers[1]

Number of new borrowers

Loan amount basis (LHS)
Number of borrowers (RHS)
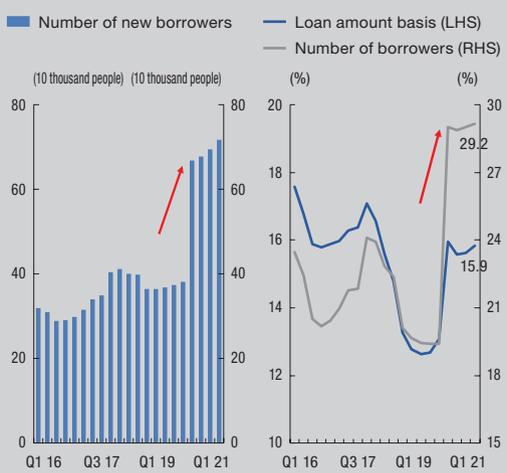
Note: 1) Borrowers with no outstanding sole proprietor loans as of the same period in the previous year.
Source: Bank of Korea (Consumer Credit Panel).

By financial sector, loans from non-bank financial institutions have increased at a rapid pace since the outbreak of COVID-19. The proportions of loans from non-bank financial institutions were relatively high in the accommodation and food service and leisure service sectors.

Loan amounts and rates of increase[1], by financial sector   Proportion[2] of loans from NBFIs, by industry

Amount of loans from banks (LHS)
Amount of loans from NBFIs (LHS)
Rate of increase in loans from banks (RHS)
Rate of increase in loans from NBFIs (RHS)

Proportion of loans from NBFIs
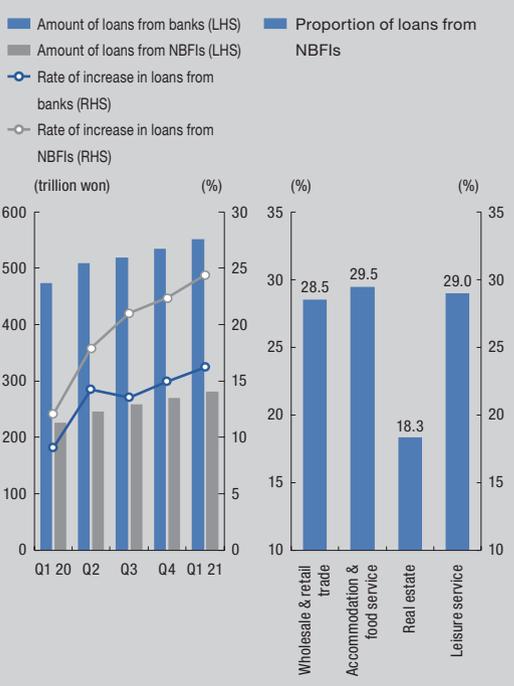
Notes: 1) Year-on-year basis.
        2) Based on loan amounts as of end-March 2021.
Source: Bank of Korea (Consumer Credit Panel).

By level of loan interest rate, the share of high-interest rate loans[4] declined from 2017 until the third quarter of 2020, at which time it began rising again. At the end of the first quarter of 2021, the share of high-interest rate loans to SEBOs was 5.2%, with the accommodation and food service (7.0%), wholesale and retail trade (6.5%), and leisure service (5.1%) sectors posting higher rates.

Amounts and shares of high-interest rate loans

- ■ Amount of high-interest rate loans (LHS)
- —○— Proportion in total loans (RHS)

Proportion[1] of high-interest rate loans, by industry

- ■ Proportion of high-interest rate loans
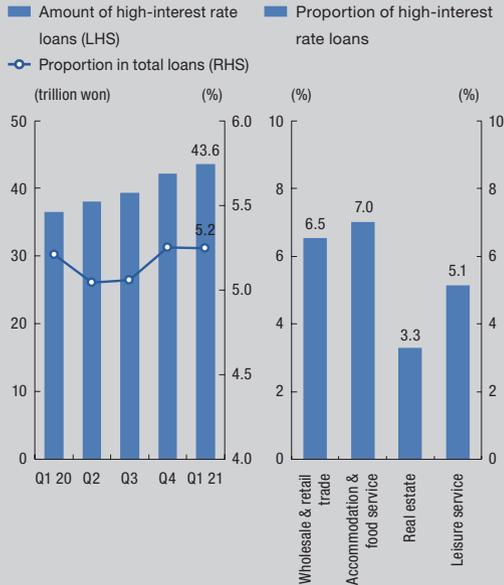
Note: 1) Based on loan amounts as of end-March 2021.
Source: Bank of Korea (Consumer Credit Panel).

At the end of the first quarter of 2021, the delinquency rate of loans to SEBOs (based on loans to sole proprietors) was rather low at 0.24%,[6] which is attributable to the increase in new loans as well as the government's financial support[5] measures, which reduced the burden of principal and interest repayment. The wholesale and retail trade and accommodation and food service sectors, which were hit hard immediately
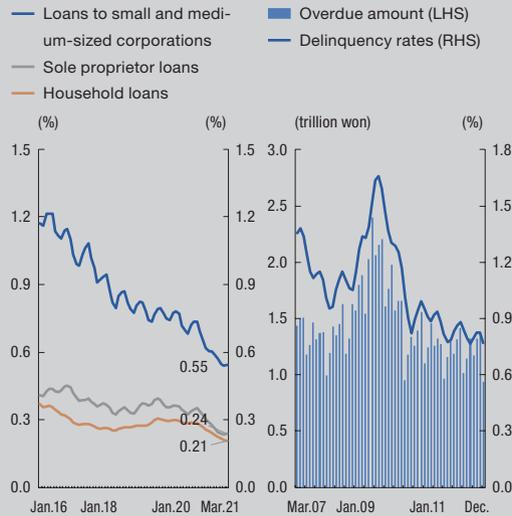
after the outbreak of COVID-19, also still maintained a low delinquency rate.[7] As a result, the delinquency rate of loans to SEBOs is now well below that recorded during the global financial crisis.

Delinquency rates[1)2)3], by loan type

- —— Loans to small and medium-sized corporations
- —— Sole proprietor loans
- —— Household loans

Delinquency rates[2)3] of loans to SEBOs[4] in GFC period

- ■ Overdue amount (LHS)
- —— Delinquency rates (RHS)

Notes: 1) Based on won-denominated loans from domestic banks.
2) Based on delinquencies of one month and longer.
3) Three-month moving average.
4) Based on sole proprietor loans from domestic banks.
Sources: Financial institutions' business reports.

At the end of the first quarter of 2021, the share of vulnerable self-employed borrowers[8] was 11.0% in terms of the number of borrowers and

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4) Loans from savings banks, credit-specialized financial companies, and private money lenders were classified as high-interest rate loans. As of the end of December 2020, based on Consumer Credit Panel data, the average interest rates of household loans to borrowers of SEBO loans were estimated by financial sector (calculated as: sum of interest payments made during 2020 / outstanding balance of loans at the end of 2019) - banks: 3.1%, non-banks: 4.7%. Nonghyup and Suhyup: 3.8%, MG community credit cooperatives: 3.7%, savings banks: 11.6%, and credit-specialized financial companies: 9.0%.

5) A principal and interest repayment deferment measure for small merchants has been in effect since April 1, 2020. The measure was scheduled to end in March 2021, but was extended by another six months (to end in September 2021).

6) This is similar to the delinquency rate of total household loans of domestic banks (0.21%) and lower than the delinquency rate of loans to small and medium-sized enterprises (0.55%).

7) At the end of the first quarter of 2021: wholesale and retail trade: 0.23%, accommodation and food services: 0.26%, and leisure services: 0.31%.

8) This refers to borrowers of multiple loans with either low income or low credit ratings. Due to data constraints, this report estimated the value of loans held by borrowers with multiple loans by considering the number of household loan lenders and number of sole proprietor loan products.

9.2% in terms of loan amount. By business sector, vulnerable borrowers were mostly engaged in the wholesale and retail trade sector and accommodation and food service sector, and in terms of the share of the total loan amount, the leisure service sector accounted for a large portion. Meanwhile, the share of vulnerable self-employed borrowers has declined moderately owing to the government's financial support, despite the effects of the pandemic.[9] At the end of the first quarter of 2020, the share of vulnerable self-employed borrowers in terms of the number of borrowers and in terms of loan amount fell by 1.2%p and 0.2%p, respectively.
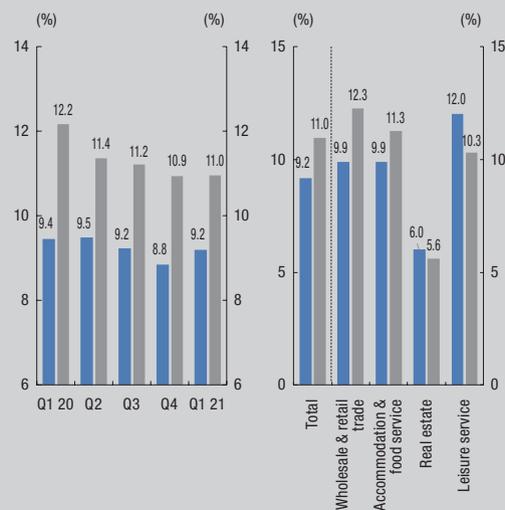
Shares of vulnerable self-employed borrowers
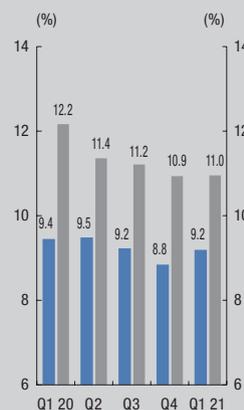
Shares of vulnerable borrowers, by industry

Source: Bank of Korea (Consumer Credit Panel).

Implications

Amid the large expansion in loans to SEBOs mostly in industries reliant on person-to-person transactions since the outbreak of COVID-19, the proportion of high-interest rate loans is rising, which implies that the quality of loans to SEBOs has deteriorated. Despite this circumstance, the delinquency rate of loans to SEBOs and the proportion of vulnerable self-employed borrowers both remained low thanks to the increase in new loans and the government's financial support. With the relaxation of social distancing, implementation of government support measures, and buildup of households' purchasing power, consumption in sectors reliant on person-to-person transactions is on the rise this year. This economic trend is likely to constrain the increase in the delinquency rate and the share of vulnerable self-employed borrowers, even with the termination of the government's financial support. Nevertheless, as delinquent loans may increase with the termination[10] of the support, increases in market interest rates, and lingering uncertainty related to COVID-19, Financial institutions need to establish a system for precisely assessing the debt repayment capacity of SEBOs and set aside additional reserves preemptively. Policy authorities, for their part, need to continue to devise measures tailored to the characteristics of SEBOs loans by business type, income, and region for customized support, enhancing the financial soundness of the loans.

9) This is largely attributed to the significant decline of the share of borrowers with low credit ratings (end of fourth quarter of 2019: 7.4% → end of fourth quarter of 2020: 4.7%). While the status of delinquency is an important factor in the assessment of credit ratings of SEBOs, the drastic decline of the delinquency rate, driven by the government's measure for deferring principal and interest repayment, helped lower the proportion of borrowers with low credit ratings.

10) The end of the deferment of principal and interest repayment for loans of SEBOs is scheduled in September 2021.

II. Asset Markets

Treasury bond yields drifted significantly higher on expectations of economic recovery in Korea and around the world, the upward trend in US interest rates, and concerns about shortages of Treasury bonds. Credit spreads on corporate bonds, which had been steadily narrowing, widened somewhat in mid-March following a spike in the volatility of Treasury bond yields, but later shrank again to gradually stabilize.

Stock prices rallied in spite of a partial correction that followed the upward spiral early this year, triggered by wariness that the sudden surge would be short-lived as the market was buoyed by the expectation of an upturn in domestic and global economic indicators and corporate earnings.

Growth in housing purchase prices showed some signs of slowdown early this year when the government unveiled its new housing market stabilization measures, but soon re-embarked on a steep upward trend (Figure Ⅱ-1).

Figure Ⅱ-1. Map[1] of changes in asset market conditions

— H2 2020 analyzed   — H1 2021 analyzed
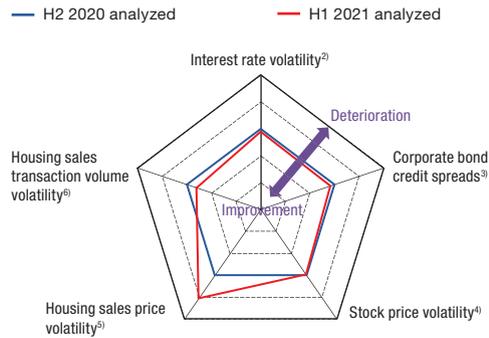
Notes: 1) Extents of change in December 2020-May 2021 (November 2020-April 2021 period for housing sales volume) compared to June-November 2020 period indexed.
2) Daily volatility of Treasury bond yield (3-yr) calculated using exponential weighted moving average (EWMA) method.
3) Corporate bond yield (A-) - Treasury bond yield (3-yr), with its extent of change as of end-November 2020 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

Rise in long-term market interest rates

Treasury bond yields continued on the upward trend begun in the second half of 2020. Early this year, the expectation of an expansionary fiscal policy by the new US administration, coupled with concerns about potential shortages of Treasury bonds that surfaced amid discussions about a new round of assistance for small businesses affected by the COVID-19 pandemic and a fourth round of disaster relief payments, sent yields higher, particularly on long-term bonds. In March, expectations of economic recovery in Korea and around the world and the rise in US Treasury bond yields, in tandem with the net selling of domestic

Treasury futures by foreigners, drove up yields on 10-year Treasury bonds to as high as 2.15% in mid-March. Yields on 3-year bonds, whose rise was comparatively limited, also surged to the 1.24% range, as they succumbed to mounting upward pressure. As a result, the gap between the yield on 3-year Treasury bonds and the Base Rate also widened further. Treasury bond yields fluctuated thereafter as the sudden surge was followed by corrections in line with changes in key economic indicators and US Treasury bond yields. In late May, however, the upward revision to the domestic economic growth forecast (3.0% → 4.0%) and worries about shortages of Treasury bonds again drove yields higher to 1.23% for 3-year bonds and 2.18% for 10-year bonds (Figure Ⅱ-2, Figure Ⅱ-3).

Figure Ⅱ-2. Korean and US Treasury bond yields
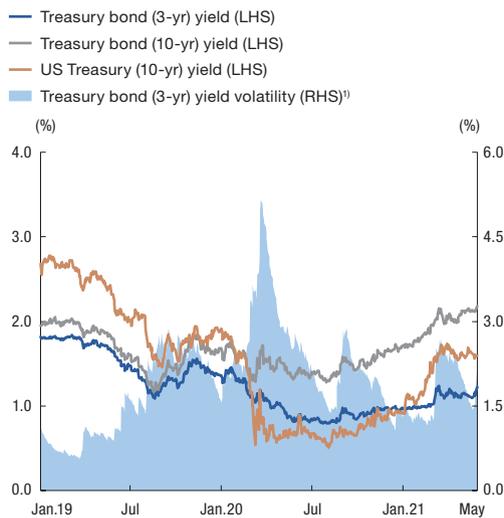
Note: 1) Daily volatility calculated using exponential weighted moving average (EWMA) method.
Sources: Korea Financial Investment Association, Bloomberg.

Figure Ⅱ-3. Base Rate and Treasury bond yield
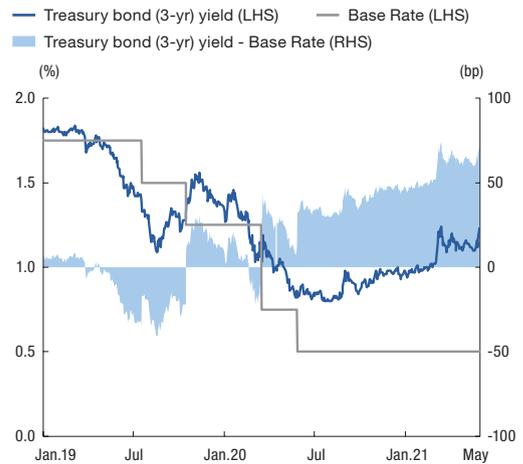
Sources: Bank of Korea, Korea Financial Investment Association.

Narrowing credit spreads on corporate bonds

Credit spreads on corporate bonds, which continuously narrowed since early this year, moved in different directions, starting in mid-March, depending on the credit rating. From the beginning of the year to early March, credit spreads steadily tightened for both prime and subprime bonds thanks to a decrease in risk avoidance as a result of the availability of COVID-19 vaccines and the execution of investments by institutional investors. However, in mid-March as the rise in Treasury bond yields dampened investor sentiment and weakened the yield incentive of corporate bonds, credit spreads on prime bonds (AA-), which until then had been sharply narrowing, started to widen significantly. On the other hand, the widening of credit spreads on subprime bonds with high yields was more moderate. From early April, credit spreads started to narrow again as the volatility of Treasury bond yields subsided.

As of May 31, the credit spreads on prime and subprime (AA-) bonds were 39bp and 134bp, down 2bp and 12bp, respectively, from the end of 2020. As credit spreads tightened more significantly for subprime than prime bonds, this caused spreads between credit ratings (between A- and AA-) to decrease from the level at the end of 2020 (Figure II-4).

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

Corporate bonds (A-) - Corporate bonds (AA-) (LHS)
Corporate bonds (A-) - Treasury bonds (LHS)
Corporate bonds (AA-) - Treasury bonds (RHS)
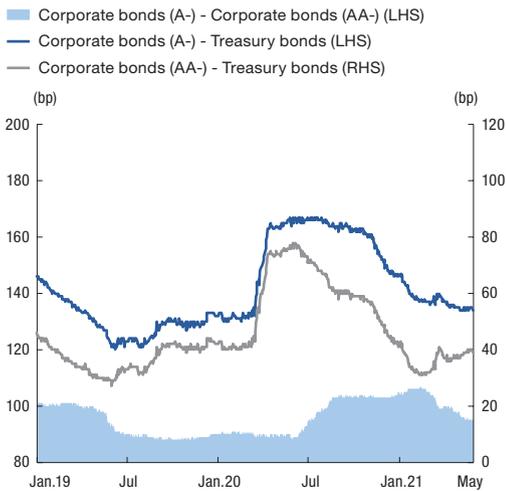
Note: 1) 3-year maturity basis.
Source: Korea Financial Investment Association.

Regard long-term time series, credit spreads on both prime and subprime bonds are currently below their respective long-term averages (January 2010 to May 2021) (Figure II-5).

Figure II-5. Corporate bond credit spreads[1][2]

Corporate bonds (A-) - Treasury bonds
Corporate bonds (AA-) - Treasury bonds

Long-term mean 141
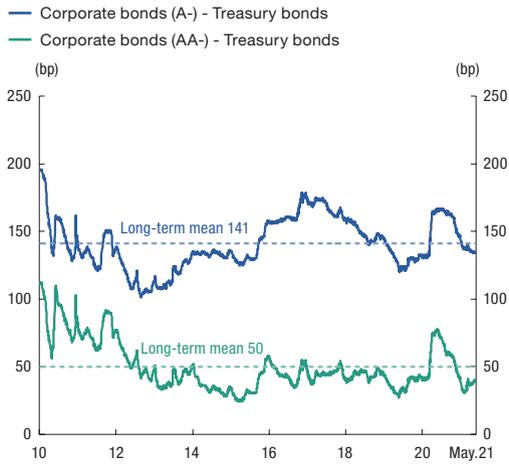
Long-term mean 50

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

In the corporate bond primary market, the value of net issuance reached KRW 9.3 trillion in January to May, the highest level since 2009 (Figure II-6).

Figure II-6. Net corporate bond[1] issuances[2]

AA and above   A   BBB and below
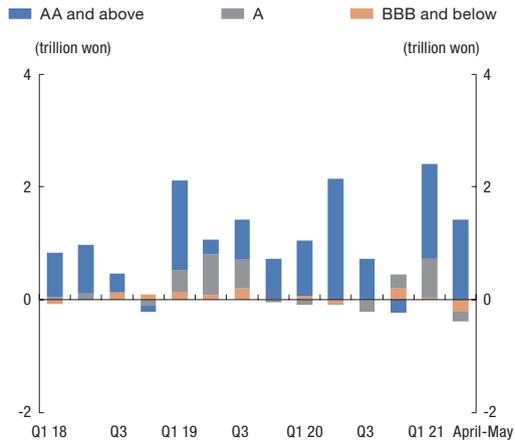
Notes: 1) Public offer basis; excluding issuance by financial companies.
2) Monthly average basis.
Sources: Bank of Korea, Korea Securities Depository.

2. Stock Markets

Soaring stock prices

Buoyed by the news of an additional stimulus package in the US and the buying spree of retail investors, stock prices continued on a steep upward trajectory throughout January. Later, however, the KOSPI index fluctuated in the 3,000 range as wariness about the sudden increase in prices set in and volatility rose in the US stock markets. In late March when investor sentiment took a favorable turn on the improvement of economic indicators in Korea and around the world, mounting expectations of strong corporate earnings, and the unveiling of a new infrastructure investment plan by the US government, stock prices resumed their upward march to hit an all-time high in May (3,249 on May 10) (Figure II-7).

Figure II-7. KOSPI and global stock prices[1]
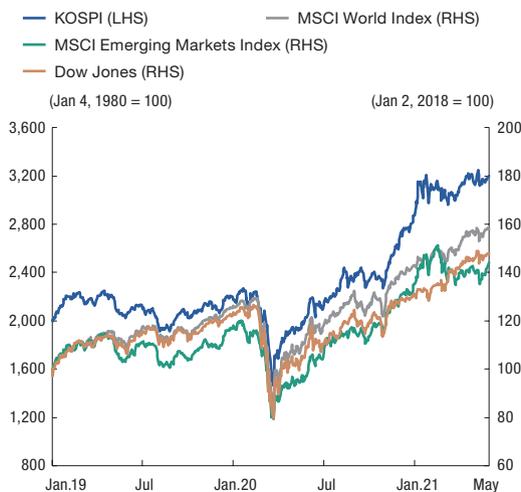
Note: 1) The US is based on the Dow Jones, and advanced and emerging market countries are based on MSCI.

Sources: KOSCOM, Bloomberg.

The KOSPI 200 volatility index (V-KOSPI) ticked higher in January to February, echoing the rise in long-term interest rates in the US and the increased volatility in stock prices, but gradually stabilized starting in March to drop to a level similar to pre-pandemic levels in early 2020 (Figure II-8).

Figure II-8. Stock price volatility indices[1]
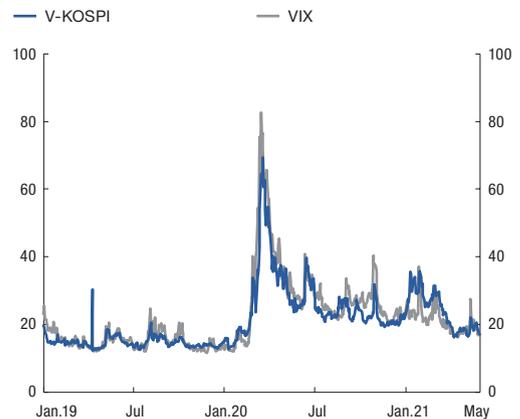
Note: 1) Volatility indices calculated using prices for options on KOSPI 200 and S&P 500 indices.

Sources: KOSCOM, Bloomberg.

Drop in PER, uptick in PBR

The price-to-earnings ratio[1] (PER) increased sharply to 15.06 in late January, but dropped afterward to as low as 11.48 in late May as corporate earnings projections kept rising while stock prices fluctuated within a relatively narrow range. The price-to-book value ratio (PBR) was lifted by soaring stock prices to 1.21 at the end of May. Both the PER and the PBR have been well above their long-term averages (9.70 and 1.02, respectively, in January 2010-May 2021) (Figure II-9).

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1) 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.

Figure Ⅱ-9. PER[1] and PBR[2]

PER(LHS)　　　　　PBR(RHS)

Long-term PBR 1.02 (Jan 2010-May 2021)

Long-term PER 9.70
(Jan 2010-May 2021)
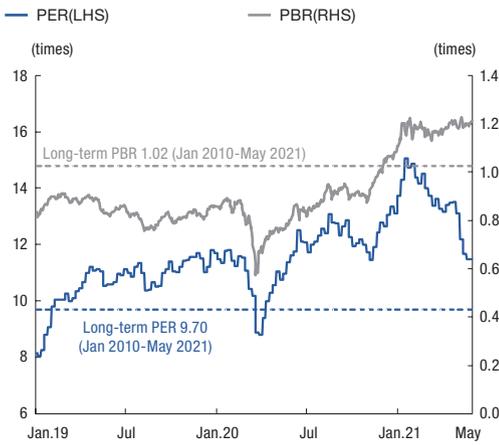
Notes: 1) MSCI basis (12-month forward).
　　　 2) KOSPI basis.
Sources: Bloomberg, Refinitiv.

The PER and PBR in Korea continued to remain low compared to advanced countries and other major emerging market countries (Figure Ⅱ-10).

Figure Ⅱ-10. PER[1)2)] and PBR[1] of major countries

PER(LHS)　　　　　◇ PBR(RHS)

(times)　　　　　　　　　　　　　　　(times)

<Advanced countries>　<EMEs - excl. Asia>　<EMEs - Asia>

United States, Australia, France, Japan, Canada, Germany, United Kingdom, Italy, Mexico, Czech Republic, Brazil, Poland, Korea, India, Thailand, Taiwan, Indonesia, Malaysia
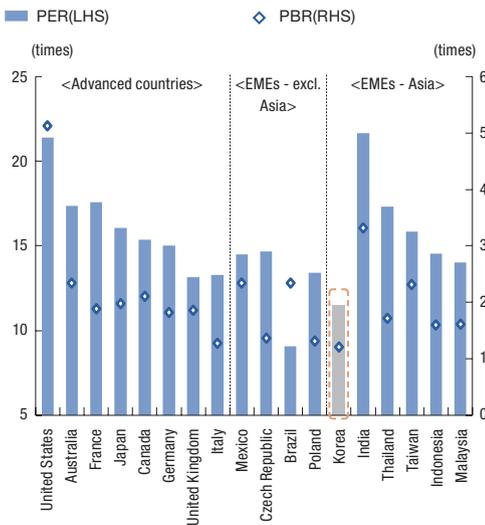
Notes: 1) End-May 2021 basis.
　　　 2) MSCI basis (12-month forward).
Sources: Bloomberg, Refinitiv.

The equity risk premium,[2] which has fallen sharply since the onset of the COVID-19 pandemic, stood at 6.53%p at the end of May, below its long-term average (7.71%p in January 2010-May 2021). A low risk premium indicates a stronger risk appetite on the part of investors (Figure Ⅱ-11).

Figure Ⅱ-11. Stock risk premium[1]

(%p)　　　　　　　　　　　　　　　(%p)

Weaker risk appetite

Long-term average 7.71
(Jan 10-May 21)

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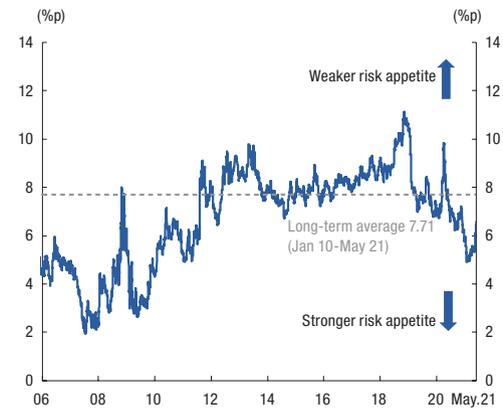
Note: 1) Treasury bond (10-year) yield subtracted from the earnings-to-price ratio (reciprocal of the 12-month forward MSCI PER).
Sources: Bloomberg, Refinitiv.

2) The equity risk premium is calculated by subtracting the Treasury bond (10-year) yield from the earnings-to-price ratio (reciprocal of the 12-month forward MSCI PER). The fact that investors hold stocks even when the excess return relative to the risk-free rate is lower than in the past indicates a higher risk appetite.

3. Real Estate Markets

Continuing steep ascent in housing purchase prices

The increase in housing purchase prices slowed slightly[4] in response to the new housing market stabilization measures by the government,[3] but soon resumed its brisk pace on concerns about a mismatch between supply and demand and expectations of price appreciation.[5] By geographic area, housing purchase prices rose significantly in the Seoul metropolitan area, including Gyeonggi and Incheon, due to upside factors such as improving transportation conditions and development projects (Figure Ⅱ-12).

Figure Ⅱ-12. Rates of increase[1] in housing sales prices
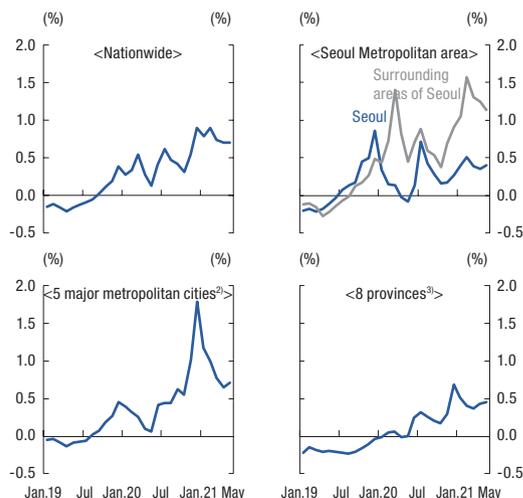
Notes: 1) Compared to previous months.
2) Busan, Daegu, Daejeon, Gwangju and Ulsan.
3) Gangwon, Chungbuk, Chungnam, Jeonbuk, Jeonnam, Gyeongbuk, Gyeongnam and Jeju.
Source: Korea Real Estate Board.

Meanwhile, as housing price growth outpaced both growth in annual household income and rent, the price-to-income ratio[6] (PIR) and the price-to-rent ratio[7] (PRR) edged higher nationwide. The PIR and PRR showed a particularly sharp rise in Seoul (Figure Ⅱ-13).

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3) The government recently announced a plan titled "Measures for a Massive Increase in Housing Supply in Major Metropolitan Areas" to acquire lots in major cities nationwide for construction of 830,000 new housing units by 2025 (February 4, 2021).

4) In 2021, the rate of increase in housing purchase prices (change from the previous month, Korea Real Estate Board) slowed from 0.89% in February → 0.74% in March → 0.71% in April → 0.70% in May.

5) The CSI on expected housing purchase prices, consistently above 100 since June 2020, has been continuously elevated also in 2021, peaking at 124 in May.

6) The PIR (price-to-income ratio) is the ratio of housing prices relative to the annual income of households.

7) The PRR (price-to-rent ratio) is the ratio of housing prices relative to annual rents.

Figure Ⅱ-13. Price-to-Income ratio and Price-to-Rent ratio

Housing Price-to-Income Ratio[1](PIR)	Housing Price-to-Rent Ratio[2](PRR)
—— Nationwide (KB Kookmin-Bank)	–– Nationwide (Korea Real Estate Board)
—— Seoul (KB Kookmin Bank)	–– Seoul (Korea Real Estate Board)

Notes: 1) Housing price / Annual household income.
2) Housing price / Annual rent.
Sources: Bank of Korea staff calculations, KB Real Estate, Korea Real Estate Board.

In January to April 2021, the volume of housing purchase transactions fell 6.5% from the same period a year earlier (399,000) to 373,000 as purchase sentiment was dampened[8] somewhat by the unveiling of a new housing supply plan by the government(Figure Ⅱ-14).

Figure Ⅱ-14. Housing sales transaction volumes

Source: Ministry of Land, Infrastructure and Transport.

Tapering off in the sharp upward trend in leasehold deposit and monthly rental prices

The increase in leasehold deposit (jeonse) and monthly rental prices, which showed a sharp acceleration during the second half of 2020, slowed since early this year as the market headed into the off-season and the steep upward trend triggered by the enforcement of the Housing Lease Protection Act[9] tapered off. However, upside potential appears to persist given the enduring concerns about supply and demand imbalances in the form of a reduced supply of new apartments and the high volume of waitlisted housing applications in plac-

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8) Following the government's announcement of its new housing supply plan (February 4, 2021), the buyer superiority index (KB Kookmin Bank) shifted to a downward trend (101.3 during the first week of February → 80.9 during the first week of April). However, the index later re-embarked on an upward trend (80.9 during the first week of April → 89.0 during the fifth week of May).

9) In the immediate aftermath of the implementation of new rules granting tenants a lease renewal option (2+2 years) and imposing rent ceilings (July 31, 2020), leasehold deposit and monthly rental prices soared as landlords raised prices before the new rules went into effect. Leasehold deposit prices, which rose 1.2% during the 6-month period leading up to the entry into force of the Housing Lease Protection Act, jumped 3.8% during the 6-month period after it went into effect.

es such as the third "New Town" development in the Seoul metropolitan area (Figure Ⅱ-15).

Figure Ⅱ-15. Rates of increase[1] in leasehold deposit and monthly rental prices

Note: 1) Compared to previous months.
Source: Korea Real Estate Board.

Figure Ⅱ-16. House leasehold deposit and monthly rental transaction volumes[1]

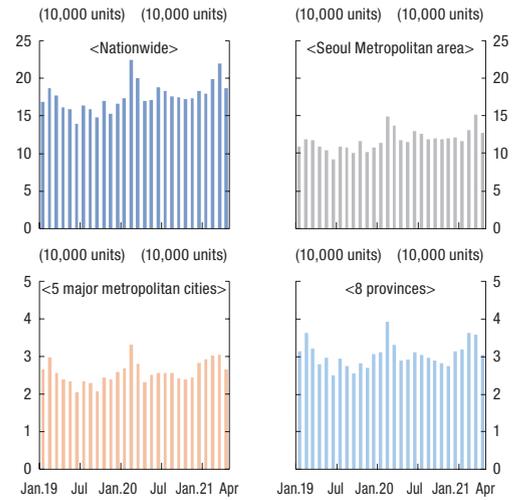Note: 1) Based on fixed date.
Source: Ministry of Land, Infrastructure and Transport.

In January to April 2021, the volume of leasehold deposit and monthly rental transactions[10] increased 2.2% from the same period of 2020 (768,000) to 785,000. By lease type, while the volume of leasehold deposit transactions dropped 1.4% year-on-year to 453,000, that of monthly rental transactions rose 7.6% to 331,000. By geographic area, the volume of transactions in the Seoul metropolitan area increased 1.8% year-on-year to 527,000, and those in the five major metropolitan areas and the eight provinces also edged higher by 4.9% and 1.7%, respectively, to 116,000 and 135,000 (Figure Ⅱ-16).

In 2021, the supply of new apartments is expected to decrease from last year's level (360,000 units) to 284,000 units, which is below the average of previous years (annual average of 310,000 in 2011-2020). The volume of new apartment sales[11] is projected to surpass last year's level (359,000 units) to 394,000 units (Figure Ⅱ-17). Meanwhile, the inventory of unsold housing stood at 16,000 units at the end of April 2021[12] (2,000 units in the Seoul metropolitan area, 14,000 units in other parts of the country), down 16.9% from the end of 2020 (19,000 units).

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10) This total, based only on contracts with fixed dates, may be different from the total volume of rental transactions.

11) 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 → 209,000 units) and other parts of the country (164,000 units → 185,000 units).

12) The inventory of unsold housing shrank steadily to hit, in March 2021, the lowest level (16,000 units) since statistics were first recorded in 2001. Although there was a small increase (3.5%) in April, in places such as Daegu, the unsold inventory remains largely below the average of previous years (monthly average of 56,000 units in 2011-2020).

**Figure Ⅱ-17. New apartment supply and new apartment sales[1]**
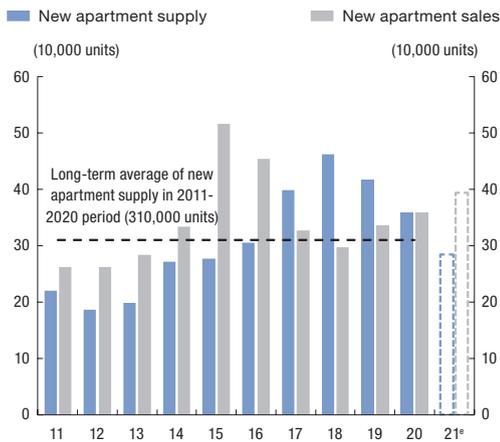
Note: 1) June 1, 2021 basis; based on sum of monthly planned amount for 2021.
Source: Real Estate 114.

Accelerated growth of commercial real estate prices

In spite of the economic slowdown, the rate of increase in commercial real estate prices has accelerated since the third quarter of 2020. During the first quarter of 2021, the rates of increase in commercial real estate prices for retail stores and offices inched up by 0.33%p and 0.41%p, respectively, from the previous quarter to 0.80% and 1.03%. The volume of commercial real estate transactions also recorded a year-on-year increase of 4.1% to stand at 86,000 during the first quarter of 2021. By geographic area, the volume of transactions rose 2.9% in the Seoul metropolitan area and 6.2% in other parts of the country to 56,000 and 31,000, respectively (Figure Ⅱ-18).

Figure Ⅱ-18. Rates of increases in commercial real estate price and volume of commercial real estate transaction
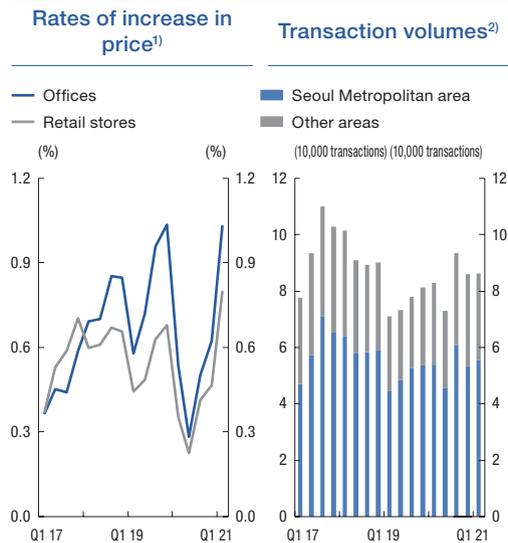
Notes: 1) Quarter-on-quarter rate of increase in asset value reflecting changes in land and building prices. Retail stores are based on medium-sized to large retail stores.
2) Based on buildings used for commercial including *officetels* (dual-purpose buildings used for commercial and residential purposes). 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.

Decline in commercial real estate rental prices

Rental prices of commercial real estate continuously declined as demand was weakened by the prolonged pandemic and the extended social-distancing rules. By property type, rental prices of retail stores and offices fell 0.3% and 0.2%, respectively, during the first quarter of 2021.[13] While the vacancy rate for retail stores edged up slightly from the end of the previous quarter (12.7%) to 13.0% at the end of the first quarter of 2021, the vacancy rate for offices remained at a level similar to the end of the previous quarter (11.0%) at 11.1% (Figure Ⅱ-19).

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13) In the case of offices, in addition to reduced rental demand, the decline in rental prices may be also attributable to discounts offered to retain tenants amid the supply of new units.

Figure II-19. Commercial real estate rental price indices and vacancy rates

Rental price indices[1]	Vacancy rates[2]

— Retail stores   — Offices
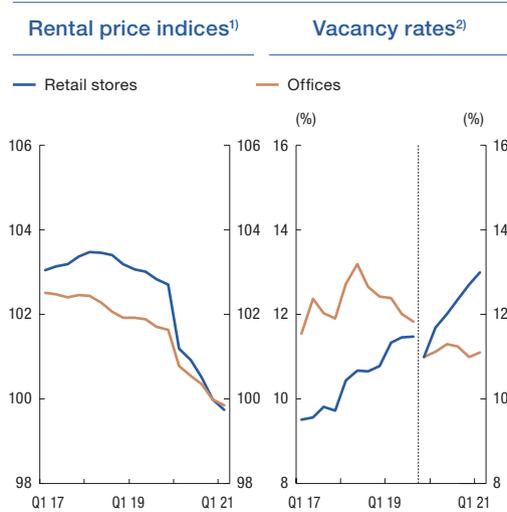
Notes: 1) Q4 2020 = 100, Based on medium-sized to large retail stores.
    2) Interrupted due to redesign of the samples of the commercial real estate market rent survey in Q1 2020, Based on medium-sized to large retail stores.
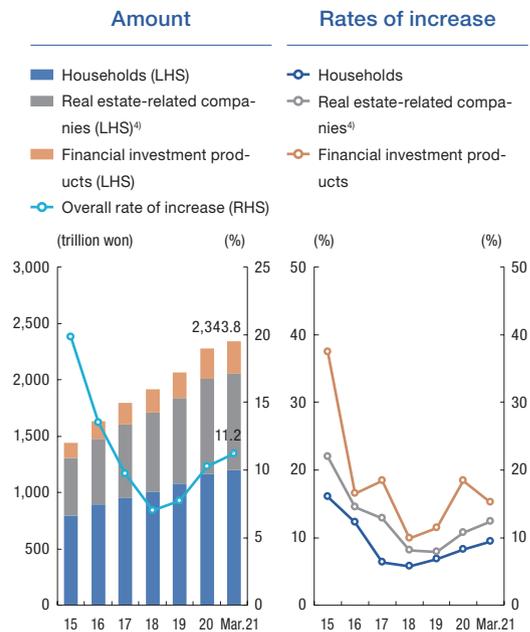Source: Korea Real Estate Board.

Increase in real estate finance exposures

At the end of March 2021, real estate finance exposures[14] stood at KRW 2,343.8 trillion, representing a year-on-year increase of 11.2%. By type, household credit rose 9.5% year-on-year to KRW 1,198.7 trillion (51.1% of total exposures), with much of this increase accounted for by personal credit guarantees associated with housing purchases and rentals. Real estate-related corporate loans jumped 12.4% year-on-year to KRW 862.8 trillion (36.8%) as the increase in new apartment sales resulted

in an increase in the issuance of sales guarantees. Financial investment products[15] were lifted by a continuously increasing volume of MBS issues to KRW 282.3 trillion (12.0%), representing a year-on-year increase of 15.2% (Figure II-20).

Figure II-20. Amount[2] and rates of increase[3] of real estate finance exposures[1]

Amount	Rates of increase

Households (LHS)
Real estate-related companies (LHS)[4]
Financial investment products (LHS)
—○— Overall rate of increase (RHS)

—○— Households
—○— Real estate-related companies[4]
—○— Financial investment products

Notes: 1) 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.
    2) End-period basis.
    3) Year-on-year basis.
    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.

Amid an uneven pace of real economic recov-

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14) Real estate finance exposures are defined as the sum of real estate-related loans to households and corporations by financial institutions and credit guarantee institutions, and real estate-related financial investment products. For more information about real estate finance exposures, refer to the June 2017 Financial Stability Report, <Box 3> 「Current Status of Real Estate Exposures」 (page 44).

15) Starting in the fourth quarter of 2019, the volume of MBS issues expanded significantly, due in part to the securitization of fixed-rate refinance loans for low-income borrowers by the Korea Housing Finance Corporation. However, the year-on-year rate of increase slowed since early 2021 as the base effect from the previous period wore off.

ery, resulting in disparity between industries and sectors, the continuous inflow of money into the real estate market appears to have worsened financial imbalances.[16] This has increased the probability of an economic shock in Korea and elsewhere in the world causing a correction in real estate prices.[17] Attention must therefore be paid to delinquency and default risks on related loans.

To sum up the above discussion on conditions in asset markets, asset price inflation in stocks and real estate, in tandem with increased leverage used to finance investment, is worsening financial imbalances.

The risk appetite and profit-driven tendency of investors appear to have strengthened recently across all segments of asset markets. In particular, the massive speculative demand for crypto-assets in spite of their uncertain economic value, causing sharp hikes in their prices, is a telling instance of how rampant risk-seeking behavior, deviated from economic fundamentals, has become prevalent in asset markets.[18]

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16) In the first quarter of 2021, the ratio of real estate finance exposures relative to nominal GDP rose to 119.9% from 109.3% in the first quarter of 2020.

17) For more on this topic, refer to <Box 5> 「Impact of Financial Imbalances on Downside Risks to Housing Prices」(page 67).

18) For a further discussion on this topic, refer to <Box 4> 「Assessment of Recent Asset Markets」(page 61).

Box 4.

Assessment of Recent Asset Markets

Amid the COVID-19 pandemic last year, most assets, such as housing, stocks, and crypto-assets, rose significantly.[1] It is highly unusual that nearly all assets have been increasing significantly during the initial phase of the post-pandemic economic recovery, with some showing signs of overheating. There is growing concern that, as asset prices soar in the short term, an internal or external shock such as a liquidity decline or capital exodus could result in drastic asset repricing. Hence, the recent status of asset markets and economic impact of asset price rises are examined hereunder, and their implications are derived.

Trends of housing, stock and crypto-asset prices after COVID-19
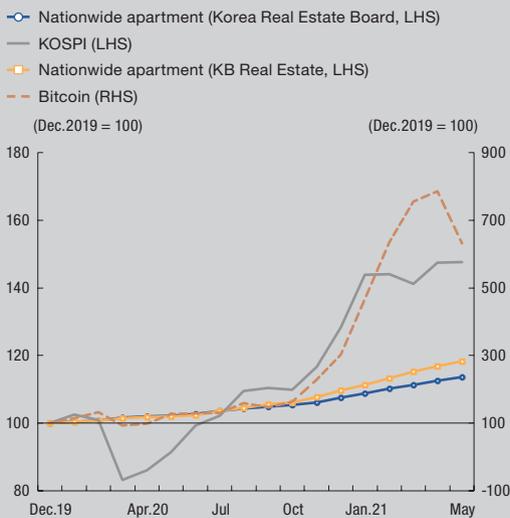
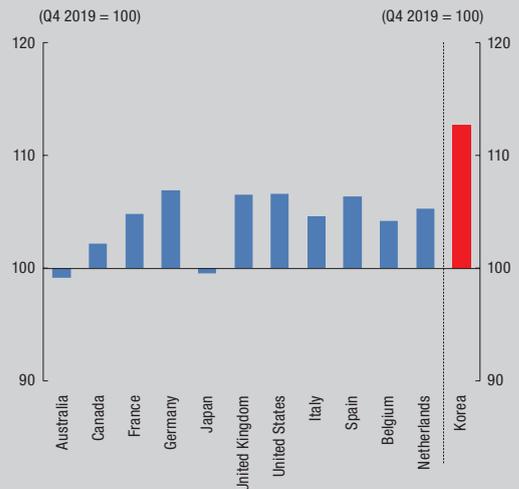Sources: Korea Real Estate Board, KB Real Estate, Korea Exchange, coinmarketcap.

Status and assessment of asset markets

(Real estate market)

Housing prices rose steeply in 2020, and have maintained their upward trend. This is attributed to a combination of factors, such as concern over the imbalance of the supply of and demand for housing, expectation of increasing prices, and accommodative macroeconomic policies amid the COVID-19 pandemic. While major economies have also seen their housing prices rise sharply since the pandemic began, the recent rate of increase of housing prices in Korea is higher than in other countries.

In particular, housing in Seoul and surrounding areas is probably overpriced considering the long-term trend of housing prices and statistical indices. More recently, housing prices in Seoul are above the long-term trend line, and the PIR (price-to-income ratio) has jumped since 2017.

Price-to-income ratio[1][2]

Notes: 1) Q4 2020 compared to Q4 2019 basis.
2) Actual transaction price basis.
Sources: Bank of Korea staff calculation, OECD, Korea Real Estate Board.

1) Some referred to the increase in assets, including commodities, as the "Everything Rally."

Trend of apartment sales price index in Seoul[1][2]

- Housing sales price index (KB Real Estate)
- Long-term trend (KB Real Estate)
- Housing sales price index (Korea Real Estate Board)
- Long-term trend (Korea Real Estate Board)

Notes: 1) Long-term trend is by HP filter.
2) Korea Real Estate Board index is available from Q1 2004.
Sources: Bank of Korea staff calculation, KB Real Estate, Korea Real
Estate Board.

Housing price to income ratio in Seoul[1][2]

- KB Real Estate
- Korea Real Estate Board

Notes: 1) Average housing price in the third quintile and household
income in urban areas basis.
2) Average is based on Q1 2012 to Q1 2021.
Sources: KB Real Estate, Korea Real Estate Board, Statistic Korea
Household Income and Expenditure Survey.

(Stock market)

Stock prices (KOSPI) rose by 120% from March 2020, when stocks plunged at the outset of the COVID-19 outbreak, to May this year. This rally outstrips the increase in stock prices in major economies during the same period.[2] The recent rise of stock prices is largely due to the continued accommodative macroeconomic policies coupled with the expectation of improved corporate earnings associated with the recovery of the Korean economy and economies worldwide. In particular, the global low-interest-rate trend has been a factor serving to push stock prices up while also raising the present value of future profits earned by stock investment and promoting the risk appetite of investors.

In terms of major indicators, it is rather difficult to determine whether stock prices in Korea are overpriced. In fact, although the excess return on risk-free assets such as government bonds (risk premium)[3] is very low, suggesting the possible overpricing of stocks, the price-to-earnings ratio (PER) remains well below that of major economies. Still, given that loans taken out to fund stock transactions have greatly increased since last year, it seems that the risk appetite of stock investors has risen significantly compared to the past.

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2) As of the end of May 2021, stock prices had risen by 119.8% in Korea from the pandemic low recorded in 2020, compared to 87.8% in the United States, 74.4% in Japan, 82.7% in Germany, 75.7% in Canada, 41.8% in the UK, and 35.9% in China.

3) Excess return on stock investment (risk premium) refers to additional profit investors expect to gain by holding stocks instead of a risk-free government bond.
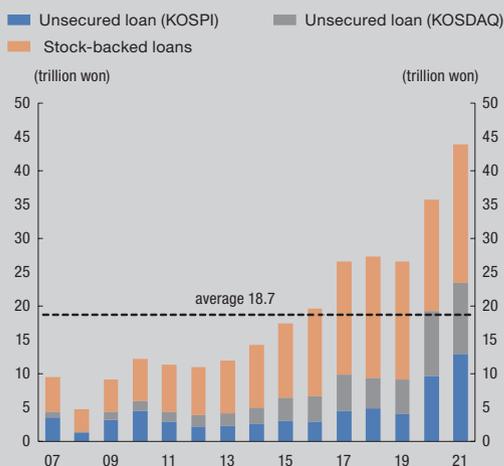
Equity risk premium against government bonds[1]

(number)   (number)

higher risk appetite   higher risk averse

Jan.21-May.21
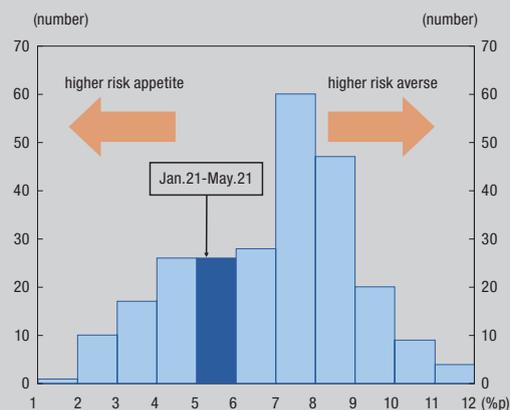
Note: 1) Excess return on stock relative to bond investment. The lower this ratio, the higher the risk appetite. The equity risk premium is calculated by subtracting the Treasury bond (10-year) yield from the reciprocal of 12 month forward PER. Based on November 2000 - May 2021.

Sources: Refinitiv, Korea Financial Investment Association.

Earning-to-price ratios in major countries[1]

— Korea   — Major countries[2]

(times)   (times)

Notes: 1) 12-month forward PER basis.
　　　 2) United States, Canada, United Kingdom, France, Japan, Germany, Italy, China.

Source: Bloomberg.

Stock-related unsecured loans and stock-backed loans[1][2]

■ Unsecured loan (KOSPI)   ■ Unsecured loan (KOSDAQ)
■ Stock-backed loans

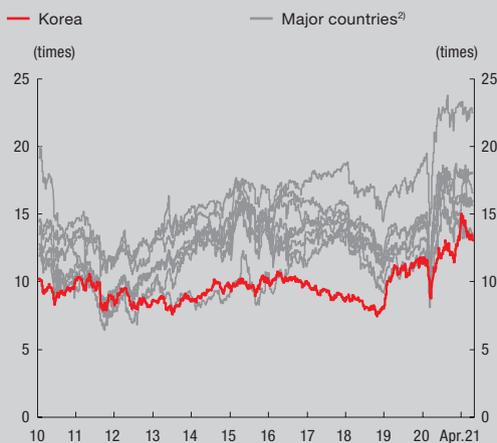(trillion won)   (trillion won)

average 18.7

Notes: 1) As of April 30, 2021. Average is based on January 2007 - April 2021.
　　　 2) KOSPI and KOSDAQ basis.

Sources: KOSCOM, Korea Financial Investment Association.
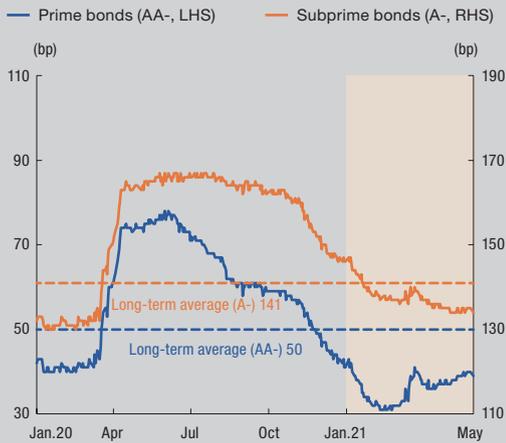
(Corporate bond market)

Amid the favorable supply and demand conditions in the corporate bond market this year, interest rates have remained stable. Corporate bond issuance is also favorable, with the credit spread remaining stable overall. Although it is not comparable to the level of the US corporate bond market, where demand is said to be overheated, the spread of corporate bond yields over Treasury bond yields has stayed continuously below its long-term average, suggesting the possibility that the risk appetite of domestic bond investors has exceeded its historical distribution.[4]

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4) In its Financial Stability Report for the first half of 2021, published in May 2021, the US Federal Reserve Board indicated that the recent risk premium in US corporate bond markets had hit one of the lowest points recorded in the past several decades, reflecting the increase in investors' risk appetite.

Corporate bond credit spread[1)2)]

— Prime bonds (AA-, LHS)   — Subprime bonds (A-, RHS)

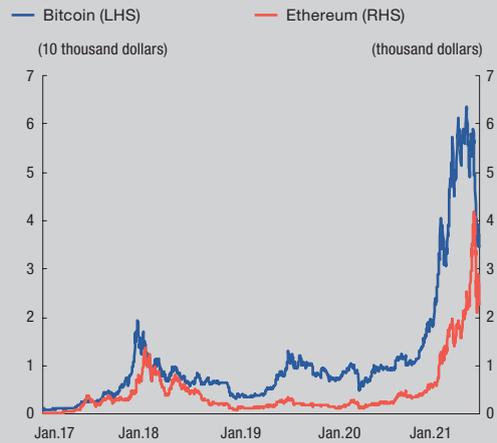Notes: 1) Spread between corporate bond and Treasury bond (3-year)
        yields.
       2) Long-term average is based on January 2010 - May 2021.
Source: Korea Financial Investment Association.

Price trends of major crypto-assets

— Bitcoin (LHS)   — Ethereum (RHS)

Source: cryptocompare.

(Crypto-asset market)

The prices of crypto-assets have risen significantly since the fourth quarter of 2020, and recently declined substantially owing to China's recent tightening of cryptocurrency regulations and deterioration of investor sentiment.[5] Overall, the latest sharp hike is particularly conspicuous when looking at the price trends of major crypto-assets since 2017, and the surge of crypto-asset prices relative to pre-pandemic levels is much greater than that of other asset prices. This dramatic rise is in large measure due to the significant increase in speculative demand worldwide as the prices of crypto-assets are expected to rise on the back of abundant global liquidity amid increasing risk appetite worldwide.

Although it is difficult to assess whether crypto-assets are priced correctly, there is no reasonable explanation for the recent development in which the value of crypto-assets traded in the domestic market exceeds that of stocks traded[6] and the price gain is much greater than that of other assets. Crypto-assets do not generate any cash flows such as stock dividends or real estate rental fees, and the possibility of crypto-assets bringing tangible or intangible benefits has not changed much recently. In this situation, market prices are continuously fluctuating, driven by the interest of some market participants and the possibility of the government moving to regulate crypto-assets. For the time being, crypto-asset prices are likely to remain highly volatile.

Economic impact of increased asset prices

Generally, a rise in asset prices is a factor that increases household consumption through the wealth effect. Higher stock prices facilitate

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5) Bitcoin price: USD 7,000 (January 1, 2020) → USD 5,000 (March 12) (annual low) → USD 64,000 (April 13, 2021) (annual high) → USD 37,000 (May 31).

6) On April 19, 2021, the transaction volume of the KOSPI was KRW 15.2 trillion, while the transaction volume on the domestic crypto-asset exchange UPbit was KRW 22.8 trillion on the previous day.

corporate funding and increase investment. Furthermore, increased asset prices boost the net asset value (collateral value) held by borrowers, expanding private credit and supporting economic recovery.[7]

However, when asset prices are overvalued or speculative demand persists, the asset market becomes vulnerable to internal and external shocks, undermining financial stability. In this situation, a small change in the market can trigger a change in investment sentiment, touching off a significant asset price adjustment. A fall in asset prices causes the financial conditions of economic players to deteriorate, generating negative repercussions across the real economy, including private consumption and investment. In particular, the inflation of asset prices is closely linked to the expansion of private sector leverage (investing with borrowed money) that had been occurring prior to COVID-19, and thus heightened insecurity in markets could destabilize the financial system and the macroeconomy.[8]

Ratios of household debt and corporate debt to nominal GDP[1)2)]
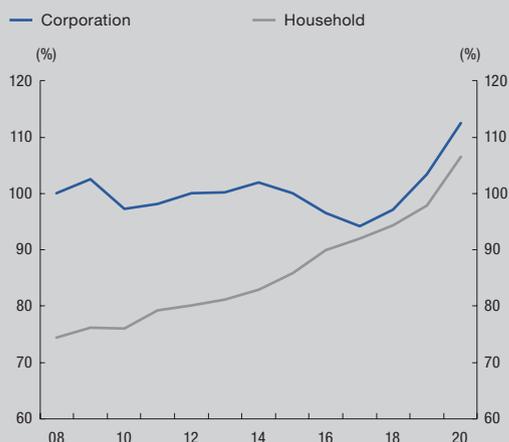
Notes: 1) Households include non-profit institutions serving households. Corporations are based on non-financial corporations.
2) Corporate debt is the sum of bonds, loans, government loans, foreign borrowing, etc.
Source: Bank of Korea Flow of Funds.

In addition, a rise in the prices of assets such as real estate contributes to boosting inequality in asset value between economic agents. This is largely due to the fact that households in the upper class in terms of assets tend to have more real estate in their portfolios, and thus a rise in real estate prices leads to a significant rise in the assets of such households.[9] In fact, the level of asset inequality exceeds that of income inequality. Hence, if asset ownership is uneven, the wealth effect arising from increased asset prices is transmitted mostly to households in the upper class in terms of assets, which have a lower propensity to consume. As a result, asset price inflation is not likely to substantially improve private consumption.

7) Kiyotaki and Moore (1997) and Pouvelle (2012) stressed that asset prices (collateral value) have a significant impact on lending by banks, and the self-enforcing relationship between asset prices and bank loans is a principal mechanism that amplifies the effect of economic shocks.

8) In its Global Financial Stability Report (April 2021), the IMF warned that a prolonged period of low interest rates and growing risk appetite could elevate financial vulnerabilities and downside risks to growth.

9) As of the end of March 2020, in terms of the share of real estate in household assets, 29.7% of the assets of households in the bottom 20% according to net assets were real estate, while 77.1% of the assets of households in the top 20% were real estate.

Top-to-bottom ratios of household net assets and disposable income[1][2]

- ○— Net asset top-to-bottom ratio (LHS)
- —— Disposable income top-to-bottom ratio (RHS)
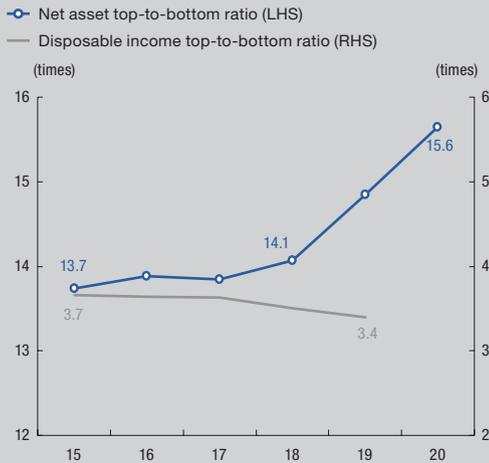
Notes: 1) Based on net assets and income top 40% / bottom 40%
ratio (average).
2) Net asset holding is based on end-March of each year.
Source: Statistics Korea Survey of Household Finances and Living
Conditions.

Implications

Although the recent increase in the prices of assets such as stocks and real estate may reflect future expectations for post-pandemic economic recovery, risk factors such as the deepening risk appetite of economic agents and increase in private sector debt need to be watched closely because asset prices have risen dramatically in a short period. It is not easy to clearly assess whether assets are priced properly, but it is likely that some types of assets in the domestic market are overvalued. In particular, as the pandemic crisis is mitigated, the focus of macroeconomic policy at home and abroad will shift and investment sentiment will contract, making it highly likely that a considerable portion of the increase in asset prices caused by speculative demand will be reversed.

Although investment in assets is an area of activity of individual economic agents, its collective outcome inevitably affects financial stability and the macroeconomy. Therefore, the buildup of financial imbalances associated with the expansion of private sector credit and asset price inflation calls for continuous attention in order to protect the macroeconomy and ensure financial stability.

Box 5.

Impact of Financial Imbalances[1] on Downside Risks to Housing Prices

Despite the sluggishness[2] of the real economy amid the COVID-19 pandemic in 2020, the abundant liquidity flows into the real estate market have driven an accelerating rise in housing sales prices,[3] deepening financial imbalances. If housing prices increase beyond the level that the real economy can tolerate, it could increase the risk of a sharp decline in housing prices in the event of an internal or external shock, thus undermining financial stability. Recently, the IMF and ECB analyzed the effect of financial imbalances on the downside risks to housing prices. Hereunder, by referring to the analysis methods used by previous studies, the downside risks to housing price are examined with a focus on the effect of the growing financial imbalances since the outbreak of the pandemic.

Status of financial imbalance

With the real economy remaining sluggish since the outbreak, both private credit and housing prices have risen steadily, causing a steep increase in the ratio of private credit to nominal GDP and the ratio of housing prices to per-capita GDP. The ratio of private credit to nominal GDP gap (hereinafter, "credit leverage gap")

and ratio of housing prices to per-capita GDP gap (hereinafter "income-housing price gap"), indicating the gaps between the ratios and long-term trends, transitioned to upward trends in the first half of 2020 and have further widened, leading to intensifying financial imbalances.

Credit leverage gap[1] and income-housing price gap[2]
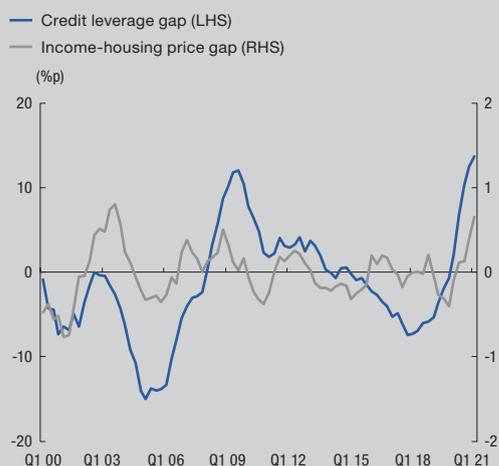
Notes: 1) Difference between the ratio of private credit to nominal GDP and its long-term trend.
2) Difference between the ratio of housing prices to per-capita GDP and its long-term trend.
Sources: Bank of Korea, KB Real Estate.

Analysis method

The downside risks to housing prices are defined as the bottom 5% boundary value (Housing price-at-Risk, or "HaR" hereafter) in the conditional distribution of future housing price growth rates[4] that could occur in the current financial environment including financial imbalances. This means that the probability of the future increase

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1) There is no official, agreed-upon definition for "financial imbalance" among central banks and scholars, but it generally refers to a concurrent combination of excessive leverage and sharp increase in asset prices.
2) Real GDP decreased sharply during the first half of 2020, recovered gradually, and, this year, returned to the level seen prior to the pandemic.
3) The increase in housing sales prices temporarily stalled in the first half of 2020, but resumed gradually. The ratio of private credit to nominal GDP surged significantly relative to the end of 2019 due to an increase in demand for funds related to housing transactions in 2020.

in housing prices being less than HaR is 5%. That is, the lower HaR, the greater the downside risks.

Concept of HaR

— Conditional distribution of future housing price growth rates[1]
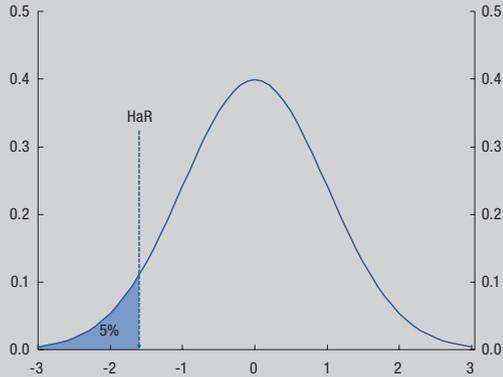
Note: 1) A hypothetical probability distribution to help understand the concept of HaR.

The conditional distribution of future housing price growth rates was estimated through quantile regression. Each quantile regression coefficient was computed by regressing variables related to the current housing price growth rate, such as financial conditions and financial imbalances as explanatory variables,[5] to the future housing price growth rate by quantile.[6]

Here, is the mean of the real housing price growth rates from quarter t to quarter t+h. The current housing price growth rate () was included as an explanatory variable, in consideration of the high persistency of housing prices. As a surrogate variable of financial conditions, the CD yield (91 days) with the long-term trend removed (market interest rate gap) was used. As for financial imbalances, the credit leverage gap (to reflect credit supply) and income-housing price gap (to reflect asset prices) were entered. is a regression coefficient estimate for q quantile.

Analysis results

The downside risks to housing prices estimated using data from the first quarter of 2001 to the first quarter of 2021 rose significantly in the first quarter of 2020, and continued rising thereafter. The estimate for HaR (for the next four quarters) moved to around 0% and then fell rapidly, approaching -1% in the first quarter of 2021. Meanwhile, the actual housing price growth rate came close to HaR in the first half of 2019 and then rose rapidly, widening the gap between them.

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4) As the estimation results herein are different from the generally used housing price predictions in terms of analysis purpose and methods, it is inappropriate to interpret these estimation results as a prediction of future housing prices. The metric model presented is designed to analyze the vulnerability posed by the growth rate of housing prices in the current financial environment using a few explanatory variables, such as financial conditions and financial imbalances. On the other hand, housing price predictions aim to precisely forecast price levels by comprehensively examining supply and demand in the housing market.

5) The IMF (2020) calculated HaR using quantile regression with explanatory variables GDP growth rate, financial conditions index (FCI), housing price level, and credit leverage gap in order to assess the downside risks to housing prices. However, GDP growth rate is excluded in this model due to the weak relationship between the GDP growth rate and housing prices.

6) As interaction between explanatory variables is not reflected in the model, each regression coefficient should be interpreted as influencing HaR, holding other explanatory variables constant.

Housing price growth rates[1] and HaR

Note: 1) Realized using CPI; based on the next four quarters' average.
Source: Bank of Korea.

Estimated coefficients of factors,[1] by forecast horizon
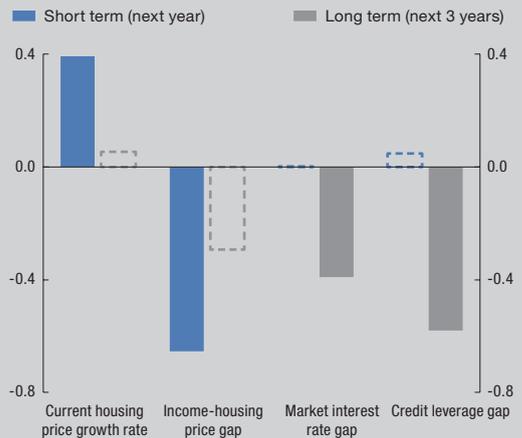
Note: 1) Estimated coefficients of standardized factors for HaR;
dotted lines indicate that the coefficients are not statistically
significant at a significance level of 10%.
Source: Bank of Korea.

Regarding the estimated coefficients of factors of HaR by forecast horizon,[7] in the short term, the estimated coefficient of the income-housing price gap was found to be a negative value, and the estimated coefficients of credit leverage gap and market interest rate gap had positive values. However, only the estimated coefficient of the income-housing price gap was statistically significant. In the long term, while the impact of the income-housing price gap decreased, the estimated coefficients of the market interest rate gap and credit leverage gap had large negative values with high statistical significance.[8] This suggests that, in the short term, the rising housing prices, divorced from income, contributed to the downside risks to housing prices, but in the long term, excessive credit leverage and interest rate hikes are major factors that push housing prices lower.

As for changes in the contribution of financial imbalances to the downside risks to housing prices by forecast horizon, in the short term, a higher gap between income and housing prices was found to work as a principal factor that lowers HaR. Credit expansion raises the growth rate of housing prices, but to a smaller degree. In the long term, the buildup of credit leverage was found to put significant downward pressure on HaR.[9]

7) To analyze short-term and long-term effects, the HaR forecast horizon was set at one year from now and three years from now, respectively.
8) The characteristics of the estimated coefficients for short- and long-term periods were similar as the forecast horizon was increased from 1 quarter to 12 quarters.
9) Meanwhile, in the short term, the decreasing of the market interest rate gap in 2020 had little impact on HaR, and in the long term, it helped elevate HaR.

Contribution of factors,[1] by forecast horizon

- ▮ Constant term
- ▮ Income-housing price gap
- ▮ Credit leverage gap
- ▮ Current housing price
- ▮ Market interest rate gap
- — HaR

(%, %p)

Short term (next year)

Long term (next 3 years)
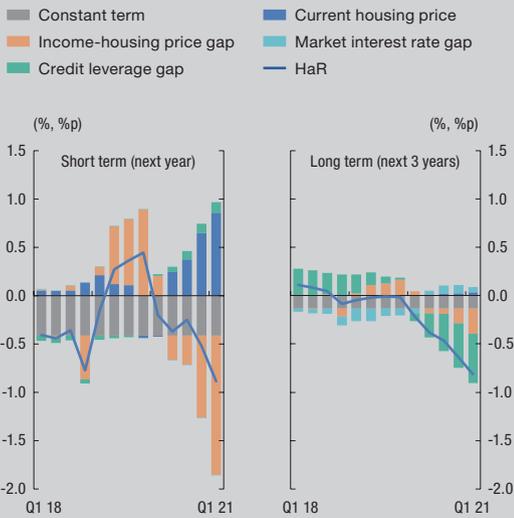
Note: 1) Contribution of factors to HaR.
Source: Bank of Korea.

Implications

Given the growing concern over increasing financial imbalances, the effect of these imbalances on the downside risks to housing prices was estimated using an econometric model. The analysis result showed that financial imbalances generated by the recently widening gap between income and housing prices and the size of credit, which has expanded significantly, could be factors that increase the downside risks to housing prices going forward. As an abrupt decline in housing prices caused by unexpected shocks amid intensifying financial imbalances could negatively affect financial stability through defaults of related loans, caution is needed to prevent financial imbalances from increasing continuously. It is necessary to gradually address financial imbalances by improving the supply and demand for housing and managing household debt so that housing prices and the size of credit do not grow at rates higher than dictated by the real economy.

Ⅲ. Financial Institutions

Amid accelerated growth in assets, the management soundness of commercial banks[1] appeared satisfactory overall as the extension of the loan forbearance and deferment program by the financial authorities helped boost the level of asset soundness, while their profitability was lifted by increased interest income.

Regarding the management soundness of non-bank financial institutions (NBFIs), amid a continuously adequate level of asset soundness, there was also a significant improvement in profitability.

Financial institutions' interconnectedness via funding and operations has intensified. Growing inter-institutional transactions, particularly between banks, have driven up their share relative to the financial sector's total assets, and the risk of default contagion across different segments of the financial system has increased as well. (Figure Ⅲ-1).

Figure Ⅲ-1. Map of changes in financial soundness conditions of financial institutions[1]

— H1 2020 analyzed   — H1 2021 analyzed
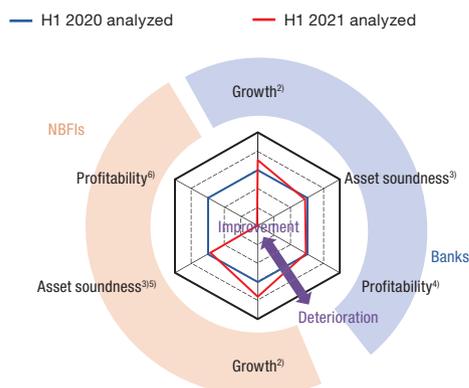
Notes: 1) Extents of change as of end-Q1 2021 compared to end-Q1 2020 indexed.
2) Rate of increase in total assets.
3) Substandard-or-below loan ratio.
4) Return on assets (ROA).
5) Excluding securities companies.
6) Average of each NBFI sector's ROA weighted by the amounts of their total assets.

Sources: Bank of Korea, commercial banks' business reports.

1. Banks

Continuously accelerated pace of asset growth

At the end of the first quarter of 2021, commercial banks' total assets (banking account basis) reached KRW 1,989 trillion, growing at a continuously brisk pace of 8.0% year-on-year, albeit slower than the corresponding rate in the first quarter of 2020 (10.2%).

By asset type, loan assets increased 9.5% year-on-year, a faster rate than in the first quarter of 2020 (8.4%). Corporate loans rose as the prolonged pandemic resulted in higher demand for working capital.[2] Household loans

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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, the Export-Import Bank of Korea, Nonghyup 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.

2) Working capital loans increased 8.5%, growing at a faster rate than during the same period a year ago (6.0%).

continued on an upward track on the back of a massive increase in unsecured household loans.[3] On the other hand, securities assets grew by only 4.6%, a sharply slower rate than in the same period of last year (13.2%). Banks' balance of government and public bonds and Monetary Stabilization Bonds grew at a negligible rate of 1.5%, reflecting the rise in long-term market interest rates during this period, as well as the easing of the liquidity coverage ratio (LCR) requirements.[4] Cash and cash equivalent assets grew 9.2%, a rate also sharply slower than in the same period a year earlier (39.9%) (Figure Ⅲ-2).

Figure Ⅲ-2. Commercial bank total assets[1]
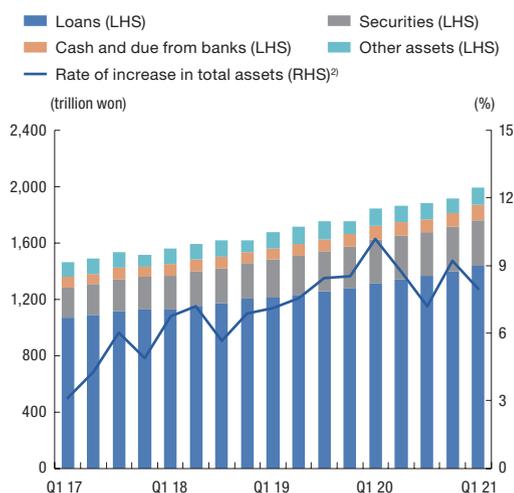
Notes: 1) End-period banking account balance basis.
2) Year-on-year basis.
Sources: Commercial banks' business reports.

When loan assets (won-denominated loan basis) are broken down by borrower type, loans to large enterprises grew only by KRW 0.9 trillion during the first quarter of 2021, increasing at a slower rate than during the same period a year earlier (KRW 9.8 trillion). On the other hand, loans to small and medium-sized enterprises (SMEs) and households rose at a faster rate than during the same period last year (KRW 11.2 trillion, KRW 10.4 trillion), adding KRW 14.4 trillion and KRW 13.2 trillion, respectively. Unlike large enterprises, which raised their capital mainly by increasing corporate bond or share issues,[5] SMEs took advantage of favorable borrowing terms offered as part of pandemic assistance to increase loans.[6] The increase in household loans was driven also by factors other than the COVID-19 pandemic, such as rising leasehold deposit prices[7] and continued investment demand (Figure Ⅲ-3).

3) At the end of the first quarter of 2021, the rate of increase (year-on-year) in unsecured household loans stood at 18.9%, far outstripping the corresponding rate for home mortgage loans (9.5%).
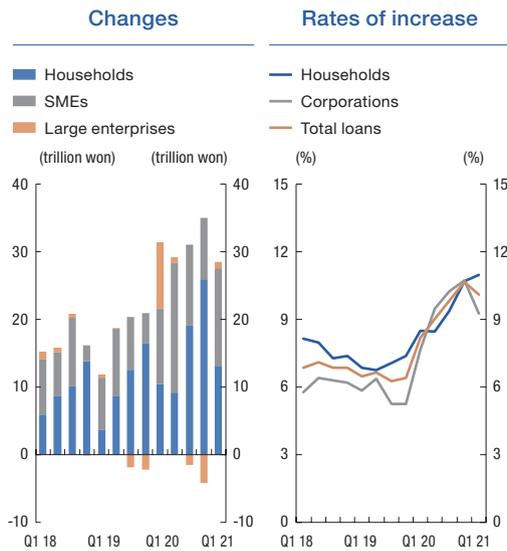
4) The effective period for the lower liquidity coverage ratio (LCR) for banks (100% → 85%), which was set to expire at the end of March, was extended until the end of September.

5) During the first quarter of 2021, the value of new corporate bond issues by large enterprises increased 19.6% from the same period last year (KRW 12.5 trillion) to KRW 14.9 trillion. The value of new share issues also increased sharply from the same period last year (KRW 0.5 trillion) to KRW 7.8 trillion.

6) According to 「Survey Results on the Lending Behavior of Financial Institutions (Q1 2021 trends and Q2 2021 outlook)」(April 13, 2021), it is predicted that domestic banks' lending attitude toward SMEs will become more relaxed and that loan demand from SMEs will increase, going forward.

7) In March 2021, the national leasehold deposit price index (by the Korea Real Estate Board) climbed to 103.3 (November 2017 = 100), corresponding to an increase of 5.8% from the same period a year earlier (97.6), which far surpasses the year-on-year increase rate in March 2020 (0.1%).

Figure Ⅲ-3. Changes[1] and rate of increase[2] in commercial bank loans[3]

| Changes	Rates of increase
■ Households	— Households
■ SMEs	— Corporations
■ Large enterprises	— Total loans

Notes: 1) Compared to previous quarters.
2) Year-on-year basis.
3) Banking account won-denominated loan basis.

Sources: Commercial banks' business reports.

Satisfactory level of asset soundness

In spite of the ongoing pandemic, the substandard-or-below loan ratio, an indicator of commercial banks' asset soundness, dropped 0.10%p from the same period last year (0.46%) to 0.36% at the end of the first quarter of 2021, helped among other factors by the extension of the loan forbearance and deferment program by the authorities (Figure Ⅲ-4).

Figure Ⅲ-4. Commercial bank bad loans[1] and substandard-or-below loan ratio[2]

■ Bad loans - new (LHS)   ■ Bad loans - disposed of (LHS)[3]
— Substandard-or-below loan ratio (RHS)
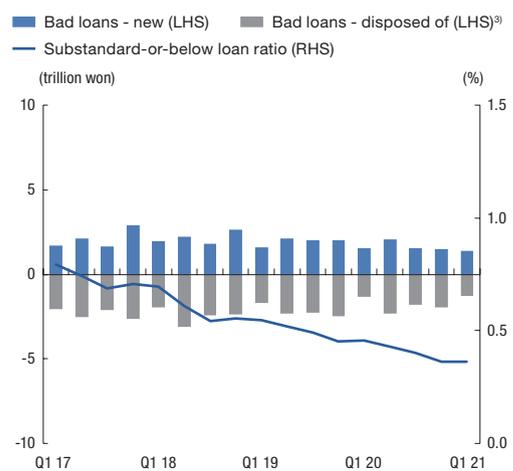
Notes: 1) During the period basis.
2) End-period basis.
3) Including those disposed of through loan withdrawals, loan loss write-offs, loan sales, soundness reclassifications, debt restructurings, etc.

Sources: Commercial banks' business reports.

The substandard-or-below loan ratio decreased on a year-on-year basis across all borrower types, including households, SMEs and large enterprises[8] (Figure Ⅲ-5).

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

— Large enterprises   — SMEs   — Households
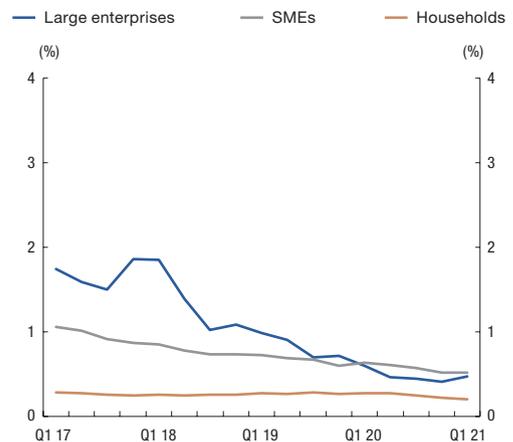
Sources: Commercial banks' business reports.

8) In the first quarter of 2021, the substandard-or-below loan ratio recorded a year-on-year decline of 0.06%p (0.27% → 0.21%) for household loans, 0.11%p (0.63% → 0.52%) for SME loans and 0.13%p (0.60% → 0.47%) for loans to large enterprises. For details on the current delinquency rate on household loans, refer to <Box 1> 「Household Loan Delinquency Rate by Vintage」(page 26).

By industry, the substandard-or-below loan ratio fell in most sectors, including transportation and storage (0.94% at the end of the first quarter of 2020 → 0.61% at the end of the first quarter of 2021), accommodation and food services (0.38% → 0.25%) and petrochemicals (0.36% → 0.27%). An exception was the automobile industry (1.15% → 1.25%) whose debt repayment capacity was weakened[9] by a decline in vehicle exports, leading to an uptick in the substandard-or-below loan ratio (Figure Ⅲ-6).

Based on substandard-or-below loan ratio trends, credit risk does not appear to have materialized, at least for the time being, thanks to an increase in loans, lower loan interest rates and deferment and forbearance. However, according to the speed and shape of real economic recovery and depending on whether the current financial relief program is continued, the possibility of default risk could come to the surface. Banks must, therefore, actively monitor loans to vulnerable sectors and borrowers benefiting from special loan terms under the financial relief program, as well as unsecured household loans, which have been increasing sharply in recent times, for potential signs of default, while at the same time setting aside sufficient loan loss provisions to proactively bolster their loss absorption capacities.

Figure Ⅲ-6. Commercial bank substandard-or-below loan ratios in major industries
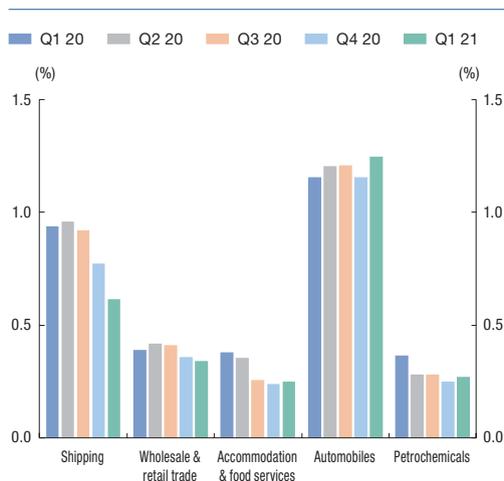
Sources: Commercial banks' business reports.

Adequate profitability

Commercial banks' profitability improved modestly compared to the same period last year.

During the first quarter of 2021, both banks' return on assets (ROA) and structural profitability shifted to an upward trend. ROA went up 0.01%p year-on-year to 0.59% (annualized basis) and the structural profitability ratio, gauging banks' capacity to generate profits in a sustained manner, ticked up by 0.02%p year-on-year to 0.92% (annualized basis) (Figure Ⅲ-7).

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9) In 2020, the operating income of companies in the automobile and trailer industry that are subject to external audit requirements fell 45.6% from the previous year, with their interest coverage ratio (operating income/ interest expenses) plummeting to 2.8 from 5.2 a year earlier.

Figure Ⅲ-7. Commercial bank profitability

- ■ Return on assets (LHS)[1)2]
- ■ Structural profitability ratio (LHS)[2)3]
- ― Net interest margin (RHS)[2]
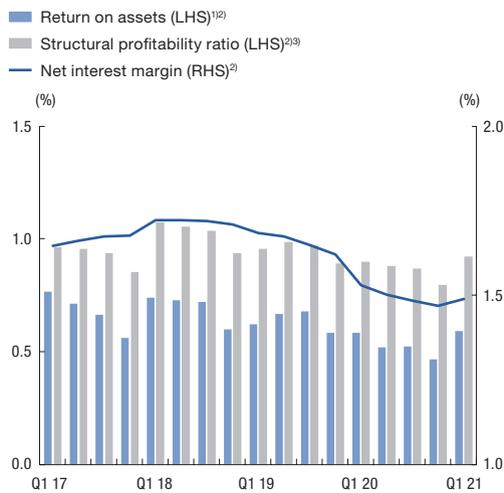
Notes: 1) Loan loss reserves excluded.
2) Accumulated quarterly incomes annualized.
3) (Interest income + Fee income + Trust account income -
   Operating expenses) / Total assets.

Sources: Commercial banks' business reports.

Figure Ⅲ-8. Commercial bank net income composition[1)2]

- ■ Interest income
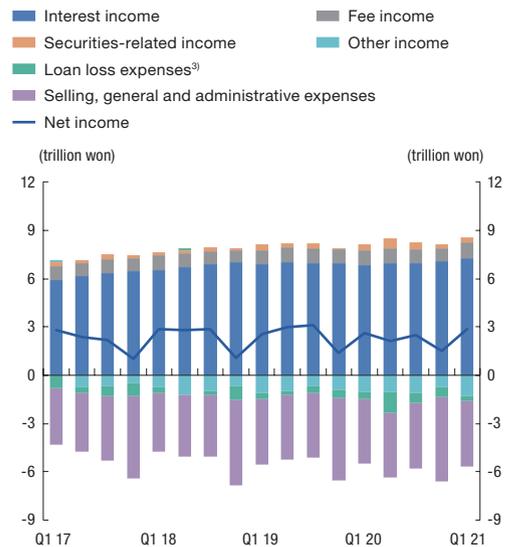- ■ Securities-related income
- ■ Loan loss expenses[3]
- ■ Selling, general and administrative expenses
- ■ Fee income
- ■ Other income
- ― Net income

Notes: 1) Loan loss reserves excluded.
2) During the period basis.
3) Including bad debt expenses, net provisions transferred,
   and profits and losses from loan sales and purchases.

Sources: Commercial banks' business reports.

During the first quarter of 2021, banks' net income increased by KRW 0.3 trillion from the same period last year (KRW 2.6 trillion) to KRW 2.9 trillion. In spite of a shrinking net interest margin,[10] interest income grew year-on-year (+KRW 0.4 trillion) on increased loans. Loan loss expenses, which were the single most important factor contributing to last year's decline in bank profitability,[11] decreased by KRW 0.1 trillion in the first quarter of 2021 as loan loss provisions were reduced during this period[12] (Figure Ⅲ-8).

Meanwhile, the recent rise in market interest rates is putting upward pressure on banks' loan interest rates. Although this can have a positive effect on banks' profitability, it can also lead to the deterioration of asset soundness by increasing the debt service burden of borrowers. Variable rate loans account for as much as 67.5%[13] of total loans by commercial banks, and thus banks must continuously monitor the debt repayment capacity of borrowers in anticipation of changes in the management environment such as a hike in market interest rates, while the same time

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10) During the first quarter of 2021, commercial banks' net interest margin stood at 1.49%, which, although lower than the 1.53% recorded during the same period a year earlier, represents a slight increase over the previous quarter (1.47%).

11) In 2020, commercial banks' loan loss expenses reached KRW 3.0 trillion, nearly double the amount in 2019 (KRW 1.6 trillion) as banks preemptively set aside loan loss provisions in anticipation of credit losses that could arise as the pandemic unfolds.

12) At the end of the first quarter of 2021, commercial banks' balance of loan loss provisions decreased by KRW 0.1 trillion from the end of last year (KRW 7.4 trillion) to stand at KRW 7.3 trillion.

13) This amount, corresponding to the share of variable rate loans in total Korean won-denominated loans as of March 2021, represents an increase from 65.0% in March 2020.

proactively managing the soundness of loan assets by strengthening the capacity to identify potentially risky borrowers.

Improving foreign currency funding conditions overseas

Overseas foreign currency funding conditions for commercial banks continued to improve. Long-term foreign currency borrowing spreads steadily decreased to drop below pre-pandemic levels on improving investor sentiment on emerging markets[14] and global investors' preference for Korean debt securities.[15] Short-term foreign currency borrowing spreads also remained low, showing a continuously stable trend (Figure Ⅲ-9).

Figure Ⅲ-9. Commercial bank short- and long-term foreign currency borrowing spreads[1)2)]
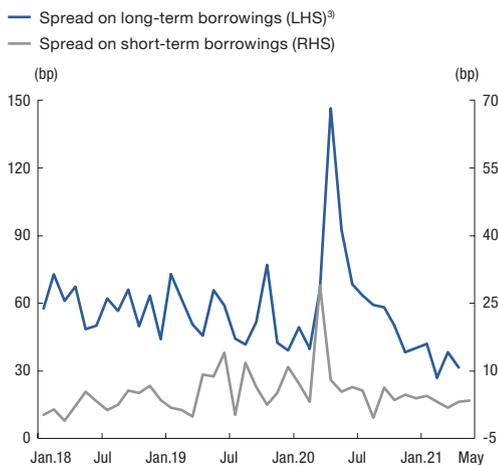
Notes: 1) Borrowing spreads based on LIBOR (average of the spreads borne by Kookmin, Shinhan, Woori and KEB Hana Banks weighted by the amounts of their US dollar borrowings).
2) Excluding borrowings between domestic financial institutions, inter-office borrowings (between head office and foreign branches) and overnight (O/N) borrowings.
3) Spreads on long-term borrowings in February 2019, December 2020 and May 2021 are unavailable due to the lack of borrowing records.
Source: Bank of Korea.

Commercial banks' CDS premia continued on a downward trend to move into territory more favorable than before the COVID-19 pandemic, and eventually hit an all-time low (Figure Ⅲ-10).

Figure Ⅲ-10. Commercial bank[1)] CDS premia[2)]
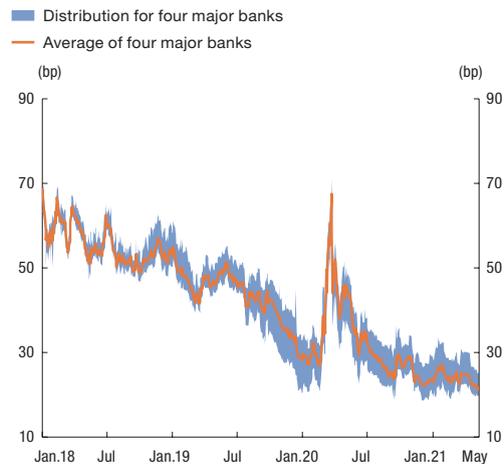
Notes: 1) Based on Kookmin, Shinhan, Woori and KEB Hana Banks.
2) 5-year maturity basis.
Source: Markit.

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14) Spreads on foreign currency-denominated bonds issued by emerging market governments or companies (relative to US Treasury bond yields) fell from 311bp in the fourth quarter of 2020 to 275bp in the first quarter of 2021.

15) The spread on foreign currency-denominated bonds issued by Woori Bank on January 26, 2021 (total worth of USD 550 million) was at an all-time low level for a nationwide bank (3-month LIBOR+24bp).

2. Non-Bank Financial Institutions

Continued asset growth

NBFIs' assets continued their upward climb to reach KRW 3,163 trillion at the end of the first quarter of 2021, representing a year-on-year increase of 7.5%. NBFIs' share of the financial sector's[16] total assets (KRW 6,556 trillion) during this period stood at 48.2%, mostly unchanged from the same period a year ago (Figure III-11).

Figure III-11. NBFI total assets
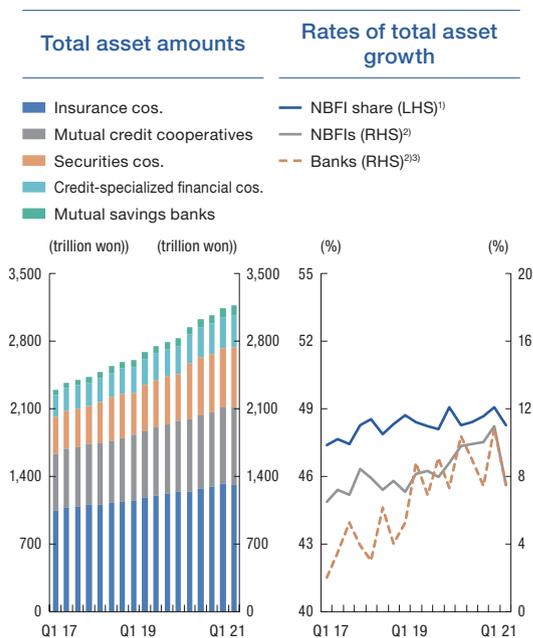
Notes: 1) Total assets of NBFIs / (Total assets of banks + Total assets of NBFIs).
2) Year-on-year basis.
3) Including commercial banks, specialized banks and foreign bank branches.
Sources: Financial institutions' business reports.

By sector, at the end of the first quarter of 2021, mutual savings banks' assets jumped 26.2% year-on-year, driven by unsecured household loans.[17] The assets of credit-specialized financial companies grew by 10.7% year-on-year on the increased use of payment cards in the online environment[18] and the resulting rise in the value of card transactions. The assets of mutual credit cooperatives saw year-on-year growth of 7.4%, lifted by a rise in non-residential real estate collateralized

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16) Encompassing banks and NBFIs, with specialized banks and domestic branches of foreign banks included among banks.

17) The year-on-year increase in mutual savings banks' unsecured household loans stood at 35.7% at the end of the first quarter of 2021, a rate far exceeding previous years' levels (annual average of 20.5% in Q1 2017-Q1 2020). For further details on this topic, refer to <Box 2> 「Recent Status of the Unsecured Household Loan Market and Implications」(page 32).

18) During the first quarter of 2021, the total authorized amount of payments for all card transactions (KRW 223.8 trillion) jumped 8.7% year-on-year on the increased volume of online shopping transactions.

loans.[19] Growth in the assets of securities companies slowed to 9.0% as a result of the base effect from last year's move to increase liquid assets in response to the COVID-19 pandemic and reduce risky assets to comply with stricter regulations.[20] The assets of insurance companies registered year-on-year growth of 5.9% on the increased issuance of loans (Figure Ⅲ-12).

Figure Ⅲ-12. NBFI rates of total asset growth[1)2)]
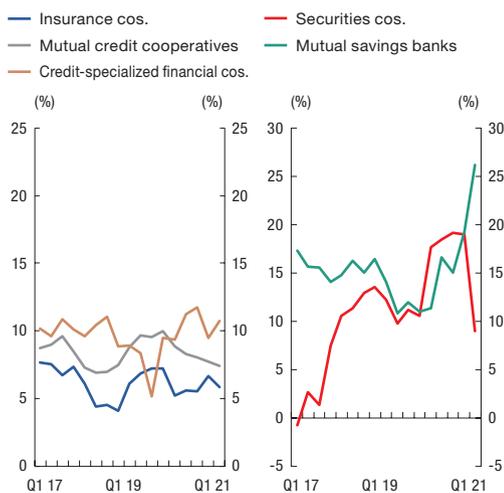
Notes: 1) Year-on-year basis.
2) Excluding accounts receivable for securities companies.
Sources: Financial institutions' business reports.

Improvement in asset soundness

The asset soundness of NBFIs showed signs of improvement, with delinquency rates and the substandard-or-below loan ratio declining across all sectors. The improvement in asset soundness indicators was most marked for mutual savings banks and credit-specialized financial companies.
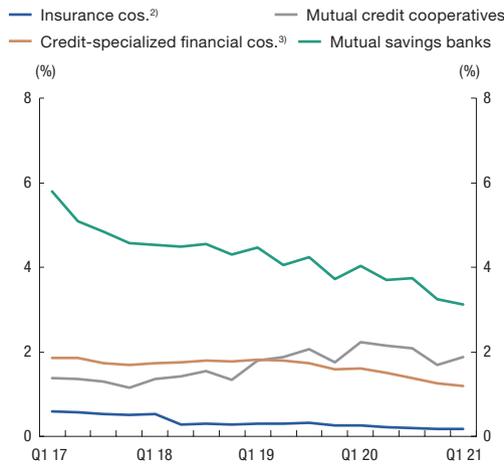
At the end of the first quarter of 2021, the delinquency rate of mutual savings banks fell 0.92%p from the same period last year to 3.12%. The substandard-or-below loan ratio of mutual savings banks also inched down by 0.76%p from the same period last year to 3.97%. The delinquency rate and the substandard-or-below loan ratio of credit-specialized financial companies decreased by 0.43%p and 0.34%p, respectively, to 1.19% and 1.37%.

The delinquency rate and substandard-or-below ratio of mutual credit cooperatives, whose increase has recently slowed somewhat, fell 0.35%p and 0.10%p year-on-year, respectively, to 1.88% and 2.19% during this period. The delinquency rate of insurance companies dropped 0.08%p year-on-year to 0.18%, while their substandard-or-below loan ratio stood at 0.17%, essentially unchanged from last year's level (Figure Ⅲ-13, Figure Ⅲ-14).

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19) At the end of the first quarter of 2021, the share of non-residential real estate collateralized loans in total loans by mutual credit cooperatives (excluding the Korea Federation of Community Credit Cooperatives) increased 14.7% year-on-year to 64.5%, continuing its recent upward trajectory. For further details on this issue, refer to <Box 6> 「Current Status of Non-residential Real Estate Loans by Mutual Credit Cooperatives and Implications」(page 81).

20) As a result of a risk management effort to meet new and more stringent asset soundness standards by the regulatory authorities, securities companies' balance of derivative-linked securities was reduced by KRW 19.2 trillion at the end of 2020, from the same period of the previous year.

Figure Ⅲ-13. NBFI delinquency rates[1]

— Insurance cos.[2]   — Mutual credit cooperatives
— Credit-specialized financial cos.[3]   — Mutual savings banks

Notes: 1) Based on delinquencies of one month and longer (for mutu-
al credit cooperatives and mutual savings banks, principal
delinquencies of one day and longer or interest delinquen-
cies 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. NBFI substandard-or-below loan ratios

— Insurance cos.   — Mutual credit cooperatives
— Credit-specialized financial cos.   — Mutual savings banks
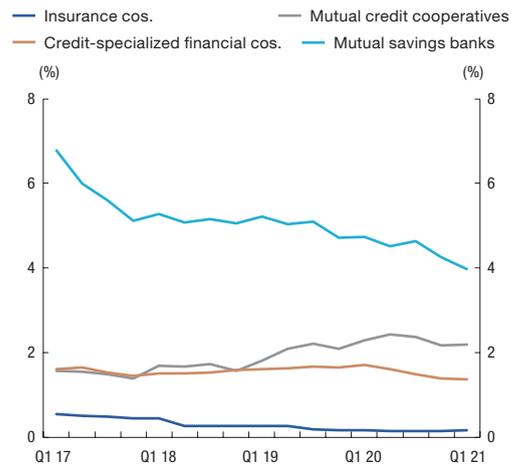
Sources: Financial institutions' business reports.

Upturn in profitability

Profitability showed an improvement across all non-bank financial sectors, with particularly strong growth seen among securities companies, mutual savings banks and insurance companies.

During the first quarter of 2021, securities companies' return on assets (ROA) rose by 1.55%p year-on-year to 1.95%, boosted by an increase in stock investment resulting in higher fee income.[21] Mutual savings banks' ROA improved by 0.74%p year-on-year to 1.99% as an increase in unsecured household loans led to widened loan-deposit margins[22] and the drop in delinquency rates reduced loan loss expenses. Insurance companies' ROA was also lifted by 0.71%p year-on-year to 1.18% by

21) During the first quarter of 2021, securities companies' fee income jumped 56.9% from the same period a year earli-
er (KRW 2.5 trillion) to KRW 4.0 trillion.

22) The share of unsecured household loans in total loans by mutual savings banks rose from 24.2% at the end of the
first quarter of 2020 to 26.9% at the end of the first quarter of 2021. The loan interest rate in effect on mutual sav-
ings banks' general unsecured household loans (new loan basis) during the first quarter of 2021 was 16.38%, far
above the rates on corporate (6.06%) and other types of loans.

a declining loss ratio[23] and the stock market boom which alleviated the reserve requirement burden.[24]

Credit-specialized financial companies' ROA rose by 0.25%p year-on-year to 1.71% during the first quarter of 2021, on the increase in the fee income of credit card companies. Mutual credit cooperatives' ROA edged up 0.12%p year-on-year to 0.45% as improving asset soundness resulted in decreased loan loss expenses (Figure III-15, Figure III-16).

Figure III-15. NBFI ROAs[1]

- Insurance cos.
- Securities cos.
- Mutual savings banks
- Mutual credit cooperatives
- Credit-specialized financial cos.
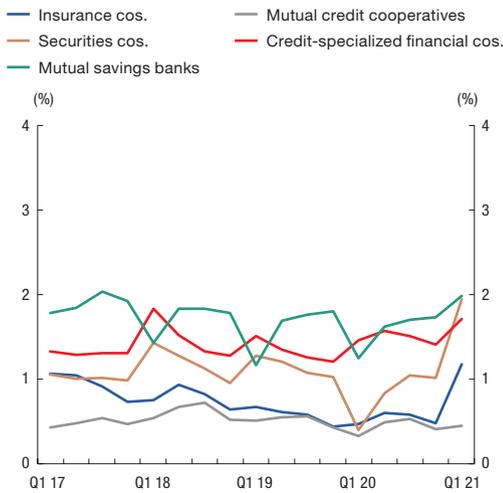
Note: 1) Accumulated quarterly incomes annualized.
Sources: Financial institutions' business reports.

Figure III-16. NBFI net incomes[1]

- Insurance cos.
- Securities cos.
- Mutual savings banks
- Mutual credit cooperatives
- Credit-specialized financial cos.
- Total
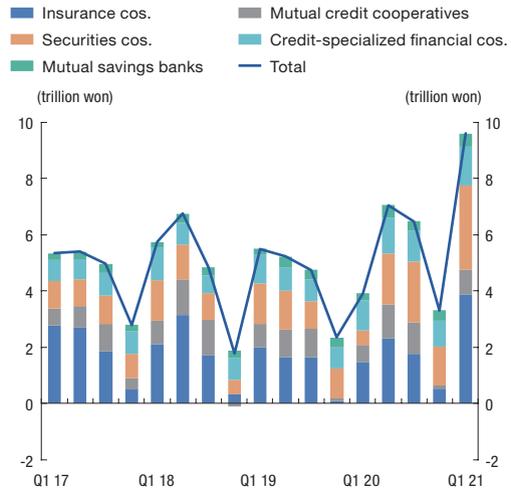
Note: 1) During the quarter basis.
Sources: Financial institutions' business reports.

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23) During the first quarter of 2021, the auto insurance loss ratio of general insurance companies dropped 5.2%p from the same period a year earlier (85.7%) to 80.5%.

24) Life insurance companies' burden from having to set aside statutory reserves to protect the guaranteed minimum benefits of variable insurance policyholders was significantly lessened by rising stock prices. The amount of the reserve reclassified as income increased by KRW 3.0 trillion from last year (-KRW 2.2 trillion in the first quarter of 2020 → +KRW 0.8 trillion in the first quarter of 2021).

Box 6.

Current Status of Non-Residential Real Estate Loans by Mutual Credit Cooperatives and Implications

Non-residential real estate loans[2] through mutual credit cooperatives[1] amounted to KRW 266 trillion as of the end of March 2021, accounting for 64.5% of total loans, with their share having risen since 2017. This is attributable to the significant decline of the growth rate of home mortgage loans due to the stricter control of household loans[3] and continued increase in non-residential real estate loans. In particular, in 2020, non-residential real estate loans rose by 13.5%, the highest rate recorded since 2016 (14.9%).

Moreover, the share of non-residential real estate loans among mutual credit cooperatives is much higher than that of other financial sectors, such as banks (28.9%) and insurance companies (16.7%).[4] This is due not only to the traditional, collateralized loan-focused practices of mutual credit cooperatives,[5] but also to the fact that mutual credit cooperatives face more demand for loans secured with collateral such as non-residential property than banks, as they have more members engaged in agriculture since they are located[6] in small cities in rural areas.[7]

This section analyzes various aspects of the recent growth of loans by mutual credit cooperatives driven by non-residential real estate loans, identifies vulnerabilities, and derives implications.

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1) Mutual credit cooperatives are nonprofit financial corporations that facilitate financing among their members based on the solidarity of farmers, fishermen, and workers in the same area. For the analysis presented here, mutual credit cooperatives include Nonghyup, Suhyup, NFCFs, and credit unions. As of the end of 2020, the number of branches of mutual credit cooperatives nationwide totaled 2,225; by sector, the number of branches was 1,118 for Nonghyup, 879 for credit unions, 138 for NFCFs, and 90 for Suhyup.

2) Refers to loans secured with real estate other than housing, such as stores, land, and accommodation facilities.

3) The customized guideline on the screening of mutual credit cooperative mortgage loans, which requires the submission of objective income evidence and application of amortizing repayments of loans for purchases of new housing, was first implemented for cooperatives with KRW 100 billion or more in assets (March 2017), and coverage was subsequently expanded to all cooperatives (June 2017).

4) As of the end of March 2021, the value (share) of non-residential real estate loans (total KRW 908 trillion) by financial sector was: banks: KRW 572 trillion (63.0%), mutual credit cooperatives: KRW 266 trillion (29.3%), insurance companies: KRW 41 trillion (4.5%), savings banks: KRW 19 trillion (2.1%), and credit-specialized financial companies: KRW 11 trillion (1.2%). Among non-bank financial institutions, mutual credit cooperatives represented the largest share.

5) Due to the risk burden, mutual credit cooperatives rely largely on real estate collateralized loans (87.3%), while unsecured loans accounted for merely 6.5% of their total loans.

6) As of the end of March 2021, non-residential real estate loans originating in the Seoul metropolitan area and non-Seoul metropolitan areas accounted for 36.2% and 63.8%, respectively, showing that the share of such loans in non-Seoul metropolitan areas is greater.

7) Since banks offer more competitive interest rates for home mortgage loans, mutual credit cooperatives tend to concentrate on non-residential real estate loans.

Amounts[1] and growth rates[2] of non-residential real estate loans of mutual credit cooperatives

Share[1] of loans by loan types of mutual credit cooperatives

- ■ Home mortgage loans (LHS)
- ■ Non-residential real estate loans (LHS)
- ■ Other loans (LHS)
- -- Total loans growth rate (RHS)
- — Home mortgage loans growth rate (RHS)
- — Non-residential real estate loans growth rate (RHS)

- ■ Home mortgage loans
- ■ Non-residential real estate loans
- ■ Other loans
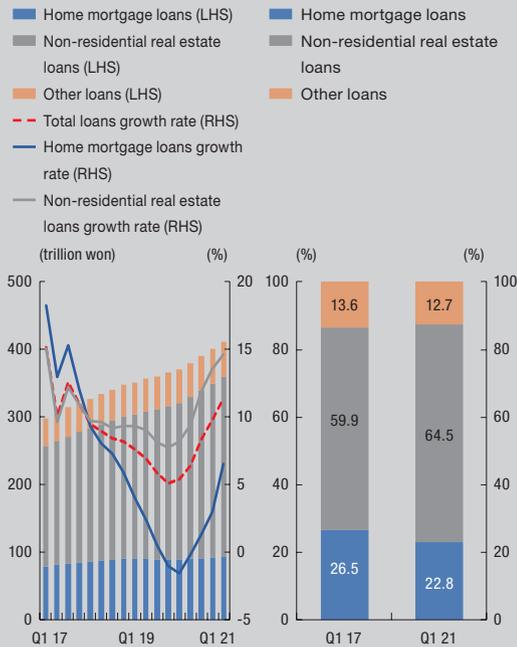
Notes: 1) End-period basis.
       2) Year on year basis.
Sources: Financial institutions' business reports.

end of 2016, with loans to businesses (corporate loans) representing the majority (87%) of the increase in non-residential real estate loans.[8] By business sector of borrowers of corporate loans, corporate loans were extended mostly to real estate-related sectors such as real estate and construction. By use of loan funds, loans for facilities investment accounted for the majority, indicating that demand for investment related to real estate development and rental dominated the growth of non-residential real estate loans. As of the end of March 2021, real estate-related sectors accounted for 53.2% of corporate loans, up 15.8%p since the end of 2016, and made up 61%[9] of the increase in corporate loans since 2017. In addition, loans for facilities investment accounted for 65.2% of non-residential real estate corporate loans, up 27.9%p, and represented 75%[10] of the increase in such loans.

Driven by the growth of corporate loans to real estate-related sectors

By type of borrower of non-residential real estate loans, the value of non-residential real estate loans extended to households and businesses reached KRW 139 trillion and KRW 123 trillion, respectively, as of the end of March 2021, rising by KRW 11 trillion and KRW 80 trillion since the
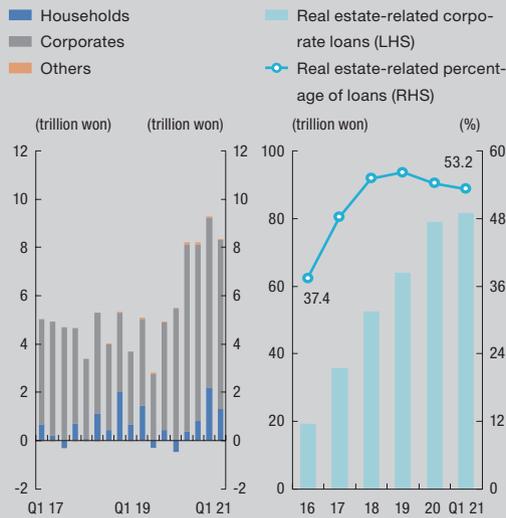
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8) As of the end of March 2021, with respect to the share of loans extended to households and businesses by mutual credit cooperatives by collateral type, household loans consisted of non-residential real estate loans (57.1%), home mortgage loans (27.7%), and unsecured loans (10.1%), while corporate loans comprised non-residential real estate loans (80.4%), home mortgage loans (15.2%), and unsecured loans (1.0%). The share of non-residential real estate loans was highest for both household loans and corporate loans.

9) As of the end of March 2021, non-residential real estate loans accounted for 80.4% of corporate loans, and this analysis was done on total corporate loans.

10) The corporate loans according to the use of loan funds was done only for loans of credit unions and Suhyup due to the non-availability of data for some types of financial institutions.

Non-residential real estate loans increase[1] by type of borrower

Size and proportion[2] of corporate loans in real estate-related industries

- Households
- Corporates
- Others

- Real estate-related corporate loans (LHS)
- Real estate-related percentage of loans (RHS)

(trillion won)   (trillion won)   (trillion won)   (%)

Notes: 1) Compared to the previous quarter, others are policy funds loans.
　　　2) Corporate loans' end-period basis.
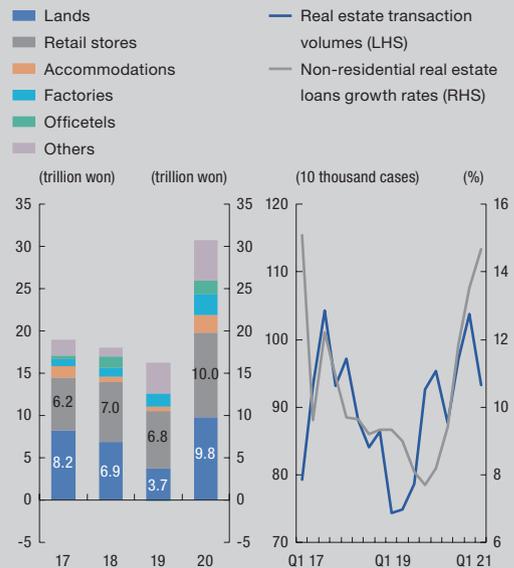Sources: Financial institutions' business reports.

Growth driven by loans secured using land and stores

By type of collateral, as of the end of March 2021, loans secured using land[11] (KRW 126 trillion, 47% of non-residential real estate loans) and stores (KRW 76 trillion, 29%) accounted for the majority of non-residential real estate loans (76%), representing 70% of the growth of non-residential real estate loans since 2017. In particular, in 2020, the majority of the collateral used to secure non-residential real estate loans was land and stores. This is likely attributable to the increase in demand for corporate loans to build or purchase buildings amid the favorable

return on investment for commercial real estate[12] as well as expectations for economic recovery. In 2020, the number of transactions related to land and commercial real estate reached 3.51 million and 340,000, respectively, up 20.8% and 10.6% from a year earlier, indicating that real estate transactions have recently started to recover since remaining stagnant since 2017.

Non-residential real estate loans increase[1] by collateral type

Non-residential real estate loans growth rate and related real estate transactions[2]

- Lands
- Retail stores
- Accommodations
- Factories
- Officetels
- Others

- Real estate transaction volumes (LHS)
- Non-residential real estate loans growth rates (RHS)

(trillion won)   (trillion won)   (10 thousand cases)   (%)

Notes: 1) Compared to the end of the previous year.
　　　2) Growth rates are on year-on-year basis, volumes are sum of lands(plot baisis, including collective transaction) and commercial real estate.
Sources: Mutual credit cooperatives federations, Korea Real Estate Board.

Since the second half of 2020, the increase in commercial real estate prices has accelerated.[13] In particular, non-residential real estate loans

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11) By type of borrower, the share of non-residential real estate household loans secured with land as collateral was 60.4% as of the end of March 2021 as most of these loans were granted to members of cooperatives, showing a proportion much higher than that of corporate loans secured with land as collateral (32.9%).

12) In 2020, return on investment for small stores and medium & large stores was 5.1% and 4.6%, respectively, far exceeding the interest rate of one-year term deposits (1.2%).

13) The prices of medium and large stores (based on return on capital) have accelerated since the second half of 2020 (Q2 2020: 0.23% → Q3 2020: 0.41% → Q4 2020: 0.46% → Q1 2021: 0.80%), and the prices of small stores have shown a similar trend (0.25% → 0.40% → 0.40% → 0.67%).

grew at a faster pace in Seoul, where the price rise was steeper.[14] From April 2020 to March 2021, the prices of medium and large stores rose by 1.9%, and the correlation coefficient between the growth rate of commercial real estate prices by region and growth rate of non-residential real estate loans stood at 0.49, showing a positive relationship.

Price growth rate[1] of commercial real estate by region and non-residential real estate loans growth rates[2]
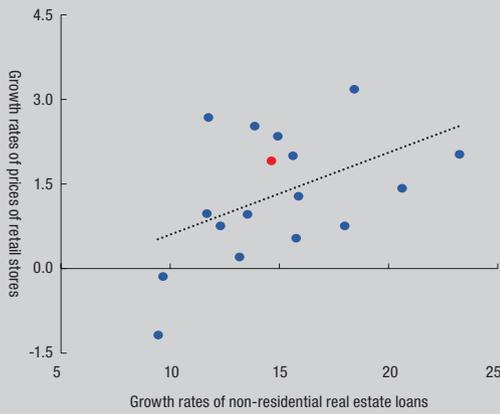

Notes: 1) Capital return basis for medium to large stores (except Sejong City).
2) In April 2020-March 2021, based on union locations; red dots are the national average.

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

Share of loans with high LTV ratio far exceeding that of home mortgage household loans

As of the end of 2020, non-residential real estate loans with high LTV ratios of over 70% accounted for 20.0% of all loans, far exceeding that of home mortgage household loans (7.7%). LTV ratios of up to 80% are allowed for corporate loans secured with collateral other than residential real estate,[15] which is less strict than the maximum LTV (70%) permitted for home mortgage household loans. The share of non-residential real estate collateralized corporate loans with high LTV ratios was 31.3%, which is three times higher than that of non-residential real estate household loans[16] (10.7%).

Loan proportion[1] of non-residential real estate loans and household home mortgage loans by LTV rate
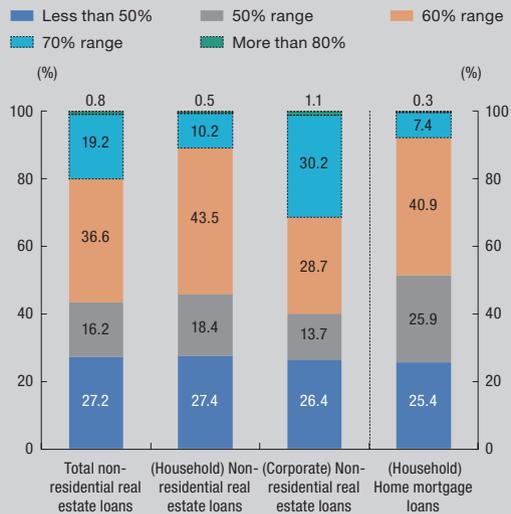
Note: 1) End-2020 basis.
Source: Financial institutions' business reports.

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14) For example, as of the end of March 2021, the prices of medium and large stores in Seoul and Gyeonggi had risen by 3.2% and 2.0%, respectively, on a year-on-year basis, exceeding the price increase nationwide (1.9%), and non-residential real estate loans in these areas soared by 18.4% and 15.6%, respectively, exceeding the average growth rate of non-residential real estate loans nationwide (14.7%).

15) After the mutual credit cooperatives policy council (November 2013), the financial authorities announced that, from 2014, LTV ratios of up to 80% are allowed for loans secured using stores and lands and requested that each financial sector set LTV ratios through internal regulations.

16) In October 2016, the financial authorities tightened the regulations on the maximum LTV ratio for mutual credit cooperatives' non-residential real estate household loans through administrative instruction (80% → 70%), causing the growth rate of non-residential real estate household loans to slow substantially in 2017 (2016: 9.2% → 2017: 1.0%).

Majority of loans carrying a floating interest rate and bullet repayment

As of the end of 2020, non-residential real estate loans with bullet repayment and a floating interest rate represented 75.5% and 87.0% of the total, respectively, down by 6.7%p and 0.3%p from the proportions recorded at the end of 2016 (82.2% and 87.3%, respectively).[17] On the other hand, the proportions of home mortgage household loans with bullet repayment and a floating interest rate were 42.8% and 83.4%, respectively, lower than those of non-residential real estate loans and showing dramatic declines of 31.5%p and 7.3%p since the end of 2016 (74.3% and 90.7%, respectively) thanks to the government's initiative to restructure household debt.

In particular, the shares[18] of mutual credit cooperatives' household loans with amortization and a fixed interest rate[19] were, despite the structural improvement of home mortgage household loans, 14.0% and 11.4%, respectively, as of the end of 2020, which are well below the 32.9% and 34.7% of household loans granted by banks.

Proportion[1] of bullet repayment and floating interest rates of non-residential real estate loans and household home mortage loans

■ Non-residential real estate loans with bullet repayment (LHS)
■ Home mortgage household loans with bullet repayment (LHS)
— Non-residential real estate loans with floating interest rate (RHS)
— Home mortgage household loans with floating interest rate (RHS)
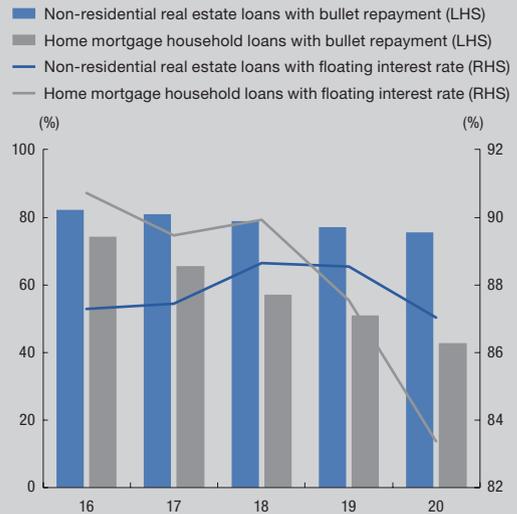
Notes: 1) End-period basis.
Sources: Financial institutions' business reports.

Greater debt repayment burden due to larger average loan amount

As of the end of 2020, the average size of non-residential real estate loans was KRW 170 million, larger[20] than that of home mortgage loans (KRW 90 million) and other loans (KRW 20 million), meaning that the debt repayment burden of borrowers of non-residential real estate loans was greater than that of others. In fact, the average debt service ratio (DSR) of borrowers

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17) As an incentive to increase amortizing loans, the financial authorities reduced the provisioning ratio for amortizing loans in the "normal" category (1.0% → 0.5%, February 2015) and raised the LTV ratio by 10%p for non-residential real estate household loans with amortization.

18) As of the end of March 2021, the proportion of non-residential real estate household loans extended by mutual credit cooperatives was 57.1%, more than double that of home mortgage loans (27.7%), but the share of non-residential real estate loans among banks' household loans was 6.5%, well below that of their home mortgage loans (41.8%). The higher share of mutual credit cooperatives' non-residential real estate loans among total household loans is due to the fact that borrowers engaged in the agriculture, fishery, and livestock industries, which represent the majority of cooperative members, tend to use household loans to raise funds either for livelihood or business purposes.

19) Including loans that apply a fixed interest rate for a certain period (five years) and then switch to a floating interest rate until maturity.

20) The value of lands and stores offered as collateral for non-residential real estate loans is usually greater than that of housing.
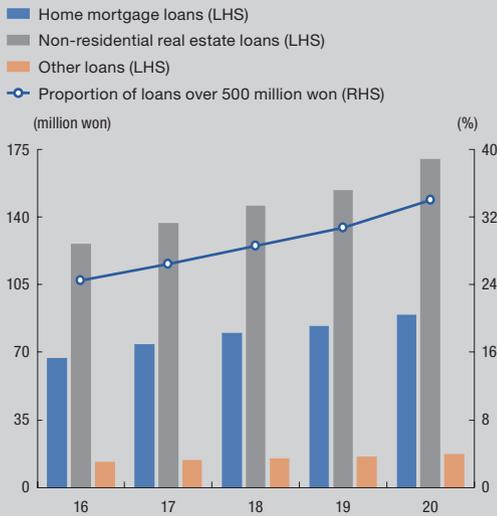
of non-residential real estate household loans stood at 364% in the first quarter of 2019, much higher than that of home mortgage loans (166%) and unsecured loans (96%).[21]

In particular, since the capital of an individual branch of a mutual credit cooperative is small[22] and most loans are non-residential real estate loans, the defaults of a few borrowers of large loans have a greater impact than they would in other financial sectors. The proportion of large loans[23] among total loans of mutual credit cooperatives was 8.7% as of the end of 2020, higher than that of other financial sectors, including banks (4.7%) and savings banks (1.8%).

Average loan amount[1] by loan type

■ Home mortgage loans (LHS)
■ Non-residential real estate loans (LHS)
■ Other loans (LHS)
◦— Proportion of loans over 500 million won (RHS)

Note: 1) End-period basis by account.
Sources: Financial institutions' business reports.
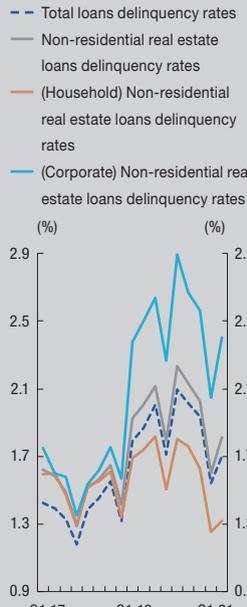
Sensitive to real estate business cycle

As mutual credit cooperatives extend corporate loans mostly to real estate-related sectors, the overall asset quality is significantly dependent on changes in the real estate business. As of the end of March 2021, the delinquency rate of all loans of mutual credit cooperatives was 1.70%, which is slightly lower than that of non-residential real estate loans, and the extent of changes in the asset quality of all loans was very similar to that of non-residential real estate loans.

Delinquency rates[1] of non-residential real estatae loans by borrower type

- - Total loans delinquency rates
— Non-residential real estate loans delinquency rates
— (Household) Non-residential real estate loans delinquency rates
— (Corporate) Non-residential real estate loans delinquency rates

Corporate delinquency amount[1] of real estate-related industries

■ Real estate-related industries
■ Other industries

Notes: 1) End-period basis.
Sources: Financial institutions' business reports.

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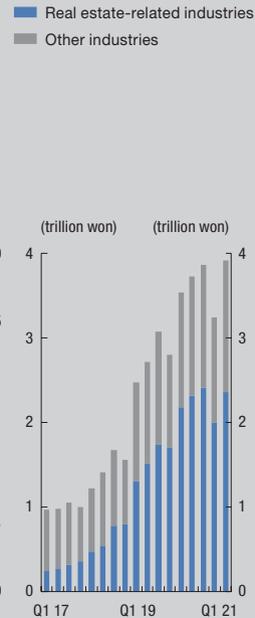
21) In the first quarter of 2019, the average DSR of household loans extended by mutual credit cooperatives was esti-
mated at 262%, significantly higher than that for banks (41%) and savings banks (112%). This is because members
of cooperatives find it difficult to submit sufficient evidence of income, resulting in their income level being underes-
timated when calculating DSR.

22) The average capital and assets of branches of mutual credit cooperatives were KRW 19.2 billion and KRW 262.6
billion, respectively, at the end of 2020.

23) "Large loan" is defined as a loan that exceeds 10% of the capital or 0.5% of the total assets (as per the standards
of the financial authorities).

As of the end of March 2021, the delinquency rate of non-residential real estate loans recorded 1.81%, down 0.42%p on a year-on-year basis. However, by borrower type, the delinquency rate of non-residential real estate loans to businesses (2.40%) was higher than that of such loans to households (1.32%), with loans to businesses showing higher volatility in delinquency rates. This is attributed to the surge in non-performing corporate loans due to the sluggish real estate business in regional areas since 2018. In 2018 and 2019, delinquent loans related to real estate businesses rose by 4.7 times, an increase significantly higher than in other sectors (1.7 times).

Implications

Non-residential real estate loans of mutual credit cooperatives have grown rapidly, driven by corporate loans to real estate-related businesses amid the expectation of the recovery of the commercial property market as well as more relaxed regulations compared to household loans, and are expected to continue rising at the same pace for the time being. Among non-residential real estate loans of mutual credit cooperatives, there is a large proportion of loans with bullet repayment[24] and higher LTV ratios, which means borrowers are constantly exposed to repayment risks associated with fluctuations in collateral value. Moreover, it should also be noted that,

among non-residential real estate loans, the average amount of loans and share of loans with a floating interest rate are greater than those of other types of loans, making borrowers' burden of debt repayment highly sensitive to changes in the market interest rate.

Hence, efforts are needed to improve the loan review system, mitigate the trend of corporate loans of mutual credit cooperatives leaning toward the real estate and construction sectors, and tighten[25] loan limits by business sector to ensure that funds are allocated to productive sectors. Furthermore, to fulfill their basic role[26] of fostering mutual assistance among members, mutual credit cooperatives need to cultivate their capabilities to assess and manage internal risks in order to provide more unsecured loans for their members.

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24) Since the share of non-residential real estate loans with bullet repayment is high, their maturity is somewhat shorter than that of home mortgage loans. The remaining maturity of non-residential real estate loans (Consumer Credit Panel database) was 3.2 years as of the end of 2020, which is one quarter of the 12.0 years of home mortgage loans.

25) As of the end of March 2021, the share of corporate loans granted to the real estate and construction sectors by mutual credit cooperatives (53.2%) was much higher than that of banks (23.8%). Given this situation, the financial authorities are in the process of revising provisions of the Credit Unions Act to limit corporate loans to the real estate and construction sectors to 30% of total loans (with the sum of loans to these two sectors not exceeding 50% of total loans) and restrict large loans to five times the capital or 25% of total assets.

26) In recent years, the share of loans extended to members (semi-members residing in regional areas) by mutual credit cooperatives has declined (end of 2016: 64.7% → end of 2018: 63.6% → end of 2020: 63.1%), whereas the share of loans to non-members has risen (35.3% → 36.4% → 36.9%). Loans to non-members will thus be limited to one-third of new loans extended in each business year (one-half for Nonghyup).

3. Interconnectedness

Continuous increase in inter-institutional transactions

At the end of 2020, the value of transactions [25] between financial institutions jumped 11.2% year on year to KRW 2,979 trillion as the solid pace of growth continued from the previous period.[26] The share accounted for by inter-institutional transactions in the financial sector's total assets (KRW 9,026 trillion, flow of funds statistics basis) also edged higher during this period to 33.0%, an increase of 0.3%p from the end of the previous year (32.7%).

Inter-bank transactions grew at the fastest rate of all inter-institutional transactions, increasing 18.1% from the end of the previous year. Inter-institutional transactions within the non-banking sector and between the banking and non-banking sectors increased 12.7% and 8.0%, respectively, during the same period. As a result, the share of inter-banking transactions in total inter-institutional transactions was lifted to 5.0% at the end of 2020 from 4.7% at the end of 2019. The share of inter-institutional transactions within the non-banking sector likewise increased to 60.1% from 59.3%. On the other hand, the share of transactions between the banking and non-banking sectors in total inter-institutional transactions declined during the same period, from 36.0% to 34.9% (FigureⅢ-17).

Figure Ⅲ-17. Mutual transactions among financial institutions and across sectors[1)2)]
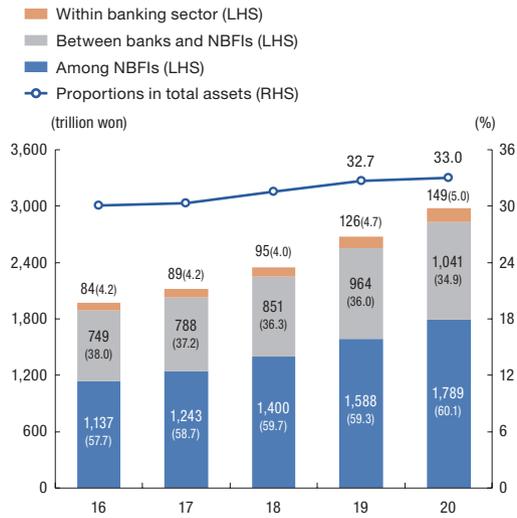
Notes: 1) Mutual transaction amounts are on an end-period basis (flow of funds statistics).
2) Figures within parentheses are the proportion of the total amount of mutual transactions.
Source: Bank of Korea.

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 2020, the aggregate value of transactions was the highest for transactions between domestic banks and trusts at KRW 239.3 trillion, followed by those between domestic banks and securities companies (KRW 202.3 trillion), between insurance companies and investment funds (KRW 194.6 trillion) and between banks and investment funds (KRW 171.9 trillion), in this order[27] (Figure Ⅲ-18).

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25) Estimated based on data from key survey questionnaires used for the compilation of the 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 the Financial Stability Report (December 2016), <Analysis of Financial Stability Issues> 「Ⅲ. Analysis of Banking System Interconnectedness, and Measurement of Cross-sectional Systemic Risk」 (page 122).

26) The year-on-year rate of increase in transactions between financial institutions changed from 7.6% at the end of 2017 → 10.7% at the end of 2018 → 14.1% at the end of 2019 → 11.2% at the end of 2020.

Figure Ⅲ-18. Financial sector interconnectedness map[1)2)3)4]
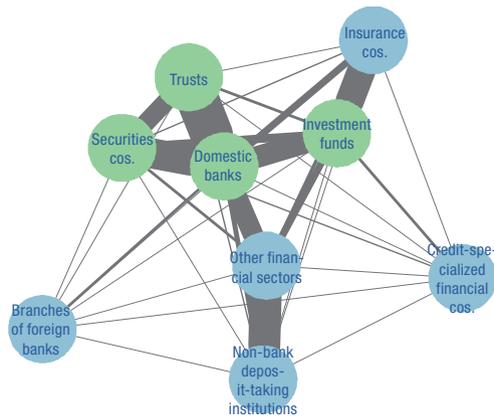
Notes: 1) ● indicate the four highest-ranked financial sectors in terms of their mutual transaction volumes.
2) Using network visualization analysis, with centrality, concentrations and line thicknesses all proportional to the mutual transaction volumes.
3) "Trusts" refers to trust accounts of banks, 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-2020 basis.
Source: Bank of Korea.

By type of financial product, deposits, bonds, and stocks accounted for the vast majority of inter-institutional transactions. At the end of 2020, transactions involving deposits and bonds represented 24.1% and 22.4%, respectively, of all transactions between financial institutions, mostly unchanged from the end of 2019. Meanwhile, the share of stock transactions in total inter-institutional transactions dropped slightly by 0.5%p to 19.8%. Loans, repos, and derivatives accounted for only a negligible share in total transactions between financial institutions (Table Ⅲ-1).

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

(trillion won, %, %p)

Product	End-2019		End-2020		B-A
	Amount	Share (A)	Amount	Share (B)	
Deposits	645.2	24.1	719.2	24.1	0.0
Bonds	602.3	22.5	667.2	22.4	-0.1
Stocks[1]	544.3	20.3	590.8	19.8	-0.5
Loans	136.3	5.1	144.1	4.8	-0.3
Repos	141.9	5.3	157.5	5.3	0.0
Derivatives	61.1	2.3	108.6	3.6	1.3

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

In the banking sector, the structure of interconnectedness between domestics banks showed a pattern of concentration around a number of large nationwide banks and specialized banks (Figure Ⅲ-19).

Figure Ⅲ-19. Domestic banking sector interconnectedness map[1)2)3]
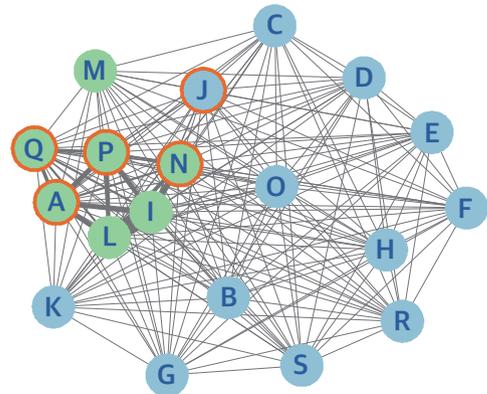
Notes: 1) Using network visualization analysis, with centrality, concentrations and line thicknesses all proportional to the mutual transaction volumes.
2) ○ indicate D-SIBs, and ● the seven highest-ranked banks in terms of their mutual transaction volumes.
3) End-2020 basis.
Source: Bank of Korea.

27) Compared to a year earlier, inter-institutional transactions within the securities sector increased by the highest amount at the end of 2020 (KRW 59.8 trillion), followed by those between domestic banks and investment funds (KRW 32.2 trillion), between domestic banks and securities companies (KRW 29.1 trillion), between insurance companies and investment funds (KRW 26.5 trillion), and between banks (KRW 22.7 trillion), in this order.

By financial product type, bond transactions accounted for the highest share in total transactions between domestic banks at 60.0%, followed by loans (16.7%) and derivatives (8.0%). Compared to the end of 2019, the shares of both bond and loan transactions fell by 2.3%p, while those of derivatives and stocks rose by 3.6%p and 2.0%p, respectively (Table Ⅲ-2).

Amid the overall increase in inter-institutional transactions, DebtRank,[28] an indicator of default contagion risk, showed an uptick for risk both between financial sectors and within the banking sector. Network-Based Systemic Risk Scoring (N-B SRS),[29] an indicator of aggregate contagion risk within the banking sector, also inched higher during this period (Figure Ⅲ-20).

Table Ⅲ-2. Volumes of mutual transactions among domestic banks, by product

(trillion won, %, %p)

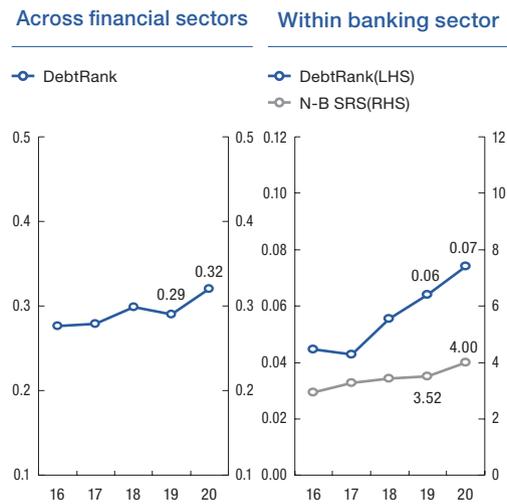| Product	End-2019		End-2020		B-A
	Amount	Share (A)	Amount	Share (B)	
Bonds	78.4	62.3	89.1	60.0	-2.3
Loans	23.9	19.0	24.9	16.7	-2.3
Derivatives	5.5	4.4	11.8	8.0	3.6
Stocks	3.9	3.1	7.6	5.1	2.0
Deposits	3.9	3.1	5.5	3.7	0.6

Source: Bank of Korea.

Increase in default contagion risk

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 has increased, while the concentration risk has remained roughly the same.

### Figure Ⅲ-20. Default contagion risks[1]

Note: 1) End-period basis.
Source: Bank of Korea.

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28) Calculated as the simple average of the ratio of aggregate losses arising from the spread of a shock from the insolvency of an individual sector (bank) to its transaction counterparties through their mutual exposures, 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).

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

As for concentration risk indicators, both the Herfindahl-Hirschman Index (HHI)[30] and the dependency ratio[31] remained unchanged from the end of the previous year for risk between financial sectors, while they showed a modest drop for risk within the banking sector (Figure Ⅲ-21).

Figure Ⅲ-21. Concentration risks[1)]

| Across financial sectors | Within banking sector |

HHI(LHS)   Dependency Ratio(RHS)
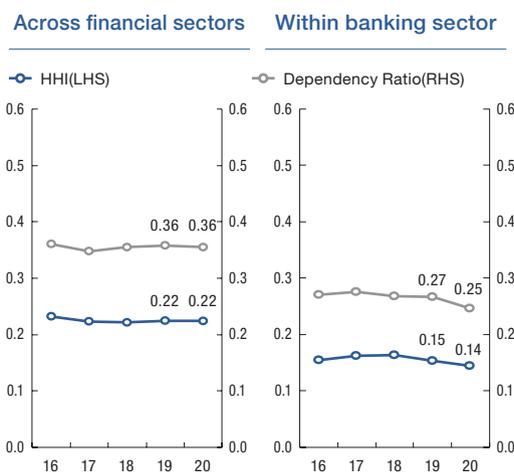
Note: 1) End-period basis.
Source: Bank of Korea.

30) 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 the weight were calculated based on fund management transactions.

31) The dependency ratio is the weighted average share in 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 the weight were calculated based on fund management transactions.

IV. Capital Flows

In January to May 2021, foreigners' domestic portfolio investment recorded a net outflow from stocks and a massive net inflow into bonds. Foreigners' stock investment moved to a net outflow as investor sentiment deteriorated amid concerns about the overvaluation of domestic stocks and the inflation in major countries. The bond market saw a massive net inflow of foreign portfolio investment, driven mainly by public investment.

Overseas portfolio investment by residents continued its ascent, centered on stocks. Investment in stocks increased sharply, driven by other financial institutions (insurance companies, asset management companies, etc.) and non-financial corporations (including individual investors), in response to rising stock prices in major countries. Meanwhile, the rate of growth in bond investment slowed on concerns about unrealized losses that could result from the upsurge in market interest rates in the US, with other financial institutions and general government (National Pension Service (NPS), Korea Investment Corporation (KIC), etc.) being the main contributors to this slowdown.

Net inflow of foreign portfolio investment into domestic securities

In January to May 2021, foreigners' portfolio investment in domestic securities[1] recorded a net inflow of USD 10.5 billion (USD 15.5 billion in stocks, +USD 26 billion in bonds). Foreigners' stock investment, continuously in a net outflow position from January to March, shifted to a small net inflow in April, on the expectation of economic recovery in Korea and around the world. However, this gave way to a massive net outflow in May on worries about US inflation and the resumption of short selling.

As central banks around the world began their first round of the year's investment in January to March, February and March saw respective inflows of USD 9 billion[2] and USD 8.3 billion of foreign portfolio investment into domestic bonds. The size of the inflow diminished, however, starting in April as the inflow of public investment tapered off and as a result of a massive volume of bonds becoming redeemed at maturity[3] (Figure IV-1).

Figure IV-1. Changes in foreigners' domestic portfolio investment[1]
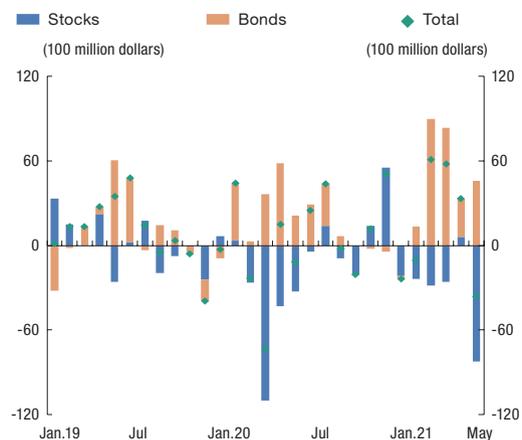
Note: 1) A "+" means net inflow, and a "-" net outflow.
Source: Bank of Korea.

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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 the amounts reaching maturity also taken into consideration).
2) This is the largest inflow recorded since related statistics were revised in January 2008.
3) USD 4.85 billion and 4.17 billion worth of bonds were redeemed at maturity in April and May, respectively.

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

Figure Ⅳ-2. Net foreigners' stock investment inflows,[1] by investor type
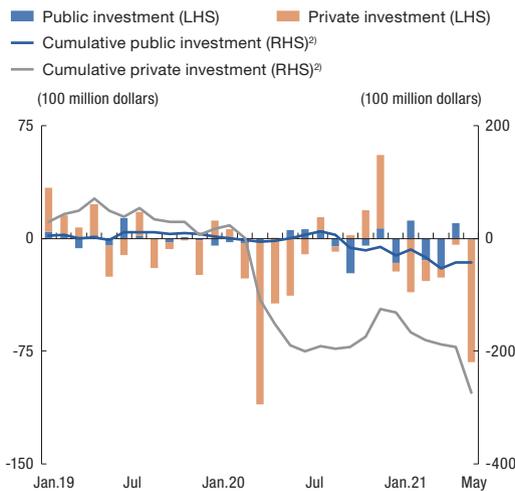
Notes: 1) A "+" means net inflow, and a "-" net outflow.
2) Cumulative sums of monthly net inflows since January 2019.
Source: Bank of Korea.

Figure Ⅳ-3. Net foreigners' bond investment inflows,[1] 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 May 2021, the balance of foreigners' stock investment stood at KRW 820 trillion, representing 30.1% of stock market capitalization,[4] a decrease of 1.3%p from the end of 2020 (31.4%). Meanwhile, the balance of foreigners' bond investment amounted to KRW 179 trillion, corresponding to 8.3% of the total balance of listed bonds, an increase of 1.0%p from the end of 2020 (7.3%).

Although the inflow of foreign portfolio investment into domestic bonds is likely to continue, the volatility of capital flows could become exacerbated going forward depending on changing market expectations for the US Federal Reserve's monetary policy stance.

Accelerated growth of overseas portfolio investment by residents

In January to April 2021, overseas portfolio investment by residents soared to USD 31.6 billion (USD 31.3 billion in stocks, USD 300 million in bonds), a sharp increase (USD 14.8 billion) from the same period a year ago (USD 16.8 billion) (Figure Ⅳ-4). This is primarily explained by a surge in investment in overseas equities as stocks recovered in major countries from the plunge caused by the COVID-19 outbreak.

4) The sum of the total market capitalizations of the KOSPI and KOSDAQ markets.

Figure IV-4. Changes in residents' overseas portfolio investment[1]
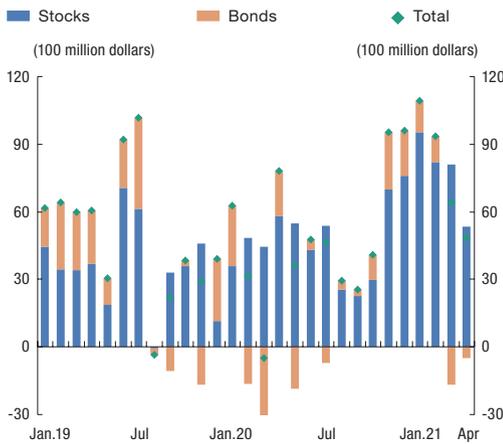
Note: 1) A "+" means net investment, and a "-" net withdrawal.
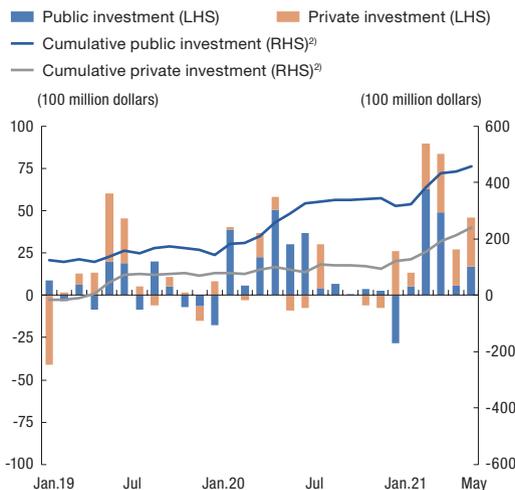Source: Bank of Korea.

By investor type, the sharp surge in stock investment was driven mainly by other financial institutions and non-financial corporations (Figure IV-5).

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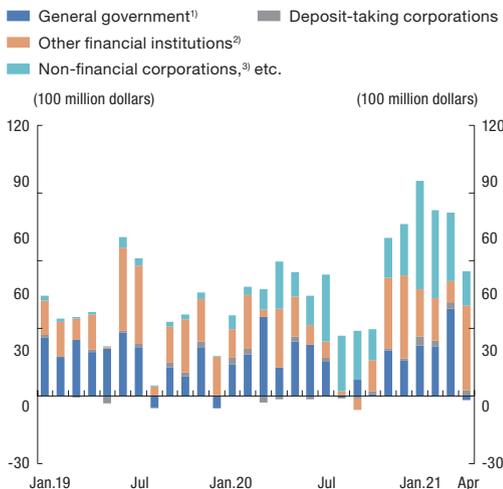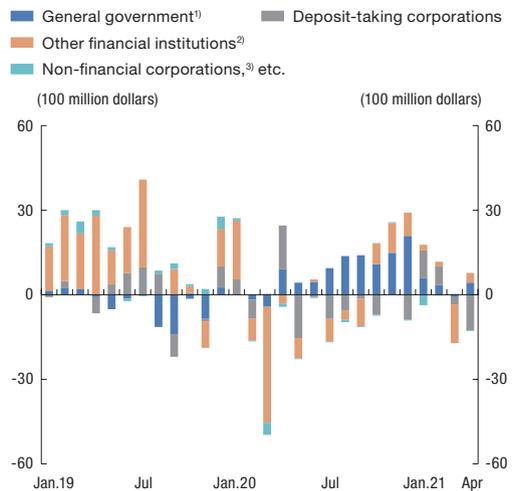

Notes: 1) National Pension Service (NPS), Korea Investment Corporation (KIC), etc.
2) Insurance companies, asset management companies, etc.
3) Including individual investors.
Source: Bank of Korea.

Meanwhile, other financial institutions and general government were the two main drivers of the slowdown in bond investment. After March, amid concerns about unrealized losses, net investment gave way to net withdrawals (-USD 2.2 billion) (Figure IV-6).

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, centered on stocks. The National Pension Service plans to continuously increase the allocations of overseas stocks and bonds in accordance with its current asset management policy.[5] Overseas portfolio investment by individual investors is also likely to stay on an upward course as COVID-19 vaccination picks up pace and economic recovery gains further momentum in major countries.

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5) According to the 2021-2025 Mid-term National Pension Fund Asset Allocation Plan (draft), the allocation of overseas stocks in the National Pension Fund's portfolio will be increased from 22.3% at the end of 2020 to 25.1% at the end of 2021, with the target allocation to be reached by the end of 2025 set to 35%. The allocation of overseas bonds will be also increased from 5.5% at the end of 2020 to 7.0% at the end of 2021, and then to around 10% at the end of 2025.

Resilience of Financial System

Ⅰ. Financial Institutions

The resilience of commercial banks has continued to be satisfactory overall. Both their capital adequacy ratio, an indicator of loss absorption capacity, and liquidity ratio, an indicator of the capacity to respond to sudden outflows of funds, were in excess of the regulatory minimums.

The capital adequacy ratio of NBFIs was slightly lower, but still remained significantly above the supervisory requirements, suggesting an adequate level of resilience.

However, going forward, when measures such as the loan forbearance program and relaxed liquidity requirements are phased out, there could be a rise in credit risk, particularly on loans to vulnerable sectors. Financial institutions must, therefore, continue with efforts to increase loan loss provisions and build up capital buffers (Figure Ⅰ-1).

Figure Ⅰ-1. Map[1] of changes in financial institution resilience

— H2 2020 analyzed   — H1 2021 analyzed
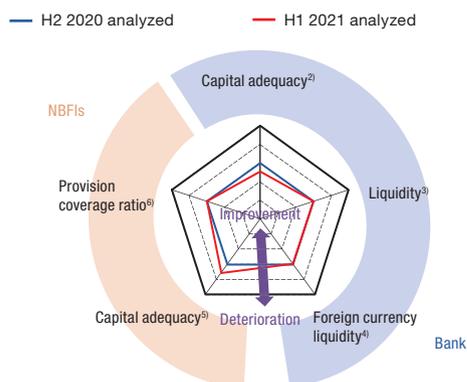
Notes: 1) Extent of change as of end-Q1 2021 (end-April 2021 for banks' liquidity and foreign currency liquidity) compared to end-2020 indexed.
2) Total capital ratio under Basel Ⅲ.
3) Liquidity coverage ratio (LCR).
4) Foreign currency LCR.
5) Weighted average of NBFI sectors' capital adequacy ratios by their total assets.
6) Excluding securities companies.

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

1. Banks

Sound loss absorption capacity

At the end of the first quarter of 2021, commercial banks' capital adequacy ratio (BIS total capital ratio) stood at 17.65%, up 0.50%p from the end of 2020 (17.15%). The Common Equity Tier 1 capital ratio edged up to 14.85%, an increase of 0.57%p from the end of last year. The total capital ratio was largely in excess of the regulatory minimum for 2021 for all banks (10.5%; 11.5% for D-SIBs,[1] 9.25% for Internet-only banks). The uptick in commercial banks' capital adequacy ratio is mainly attributable to the improvement in net income and the adoption of the Basel III final rule[2] by

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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).

some banks. The provision coverage ratio (loan loss provisions / substandard-or-below loans), measuring banks' capacity to absorb expected losses, slipped 4.6%p from the end of the previous year (146.8%) to 142.2%, which, however, is still above the level before the onset of the COVID-19 pandemic. Notwithstanding, given the fact that the current low volume of substandard-or-below loans is in large part due to the principal and interest payment deferment measure and other financial relief programs, banks need to continue to prepare for any future rise in default risk (Figure Ⅰ-2, Figure Ⅰ-3).

Figure Ⅰ-2. Commercial bank Basel Ⅲ-basis capital ratios and provision coverage ratio[1)2)3)4)]

- Total capital ratio
- Tier 1 capital ratio
- Common Equity Tier 1 capital ratio
- Loan loss provisions (LHS)
- Loan loss reserves (LHS)
- Provision coverage ratio (RHS)

Regulatory standard for 2021 (10.5%)
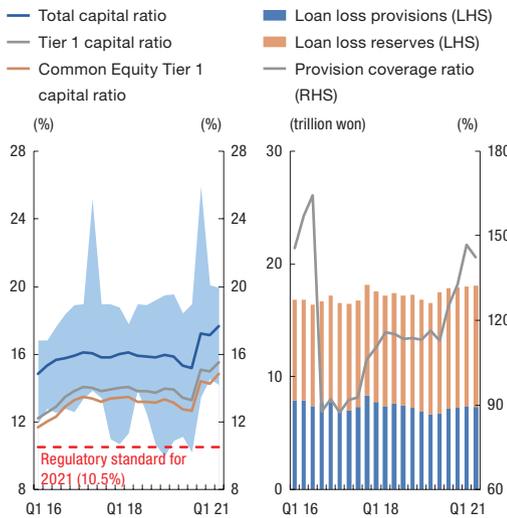
Notes: 1) End-period basis.
2) Provision coverage ratio = Loan loss provisions / Substandard-or-below loans. Loan loss reserves were included in loan loss provisions until Q3 2016, and loan loss reserves have been included in common equity tier 1 capital since then.
3) Regulatory standards for 2021: 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).
4) Shaded area indicates distribution of individual banks' total capital ratios.

Sources: Commercial banks' business reports.

Figure Ⅰ-3. Commercial bank capital ratio decomposition[1)2)]

- Common Equity Tier 1 capital
- Additional Tier 1 capital
- Tier 2 capital
- Risk-weighted assets
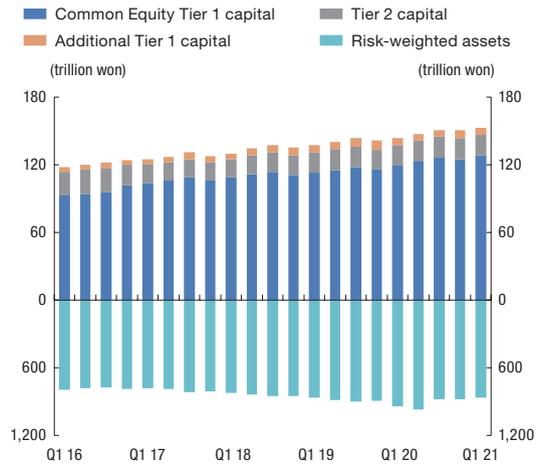
Notes: 1) End-period basis.
2) From Q4 2016, Common Equity Tier 1 capital includes loan loss reserves.

Sources: Commercial banks' business reports.

At the end of the first quarter of 2021, commercial banks' leverage ratio[3)] was 5.79%, down 0.13%p from the end of 2020 (5.92%). This was primarily due to an increase in total exposure, caused by a rise in household and corporate loans. Nevertheless, the leverage ratio is currently well above the regulatory minimum requirement (3%) for all banks (Figure Ⅰ-4).

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2) As the Basel III final rule lowers risk weights assigned to SMEs and the loss given default (LGD) of corporate loans in the calculation of credit risk, its adoption has the effect of reducing risk-weighted assets and thereby boosting the capital adequacy ratio.

Figure I-4. Commercial bank leverage ratios[1)2)3)]
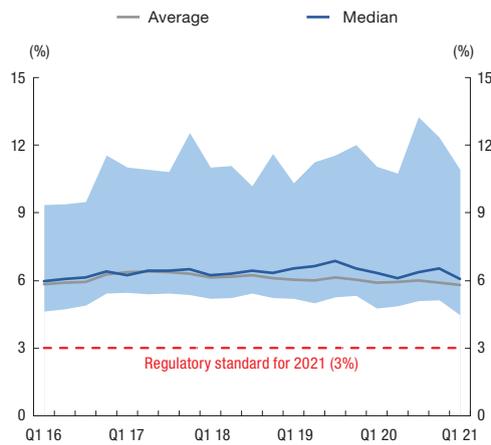
Notes: 1) Tier 1 capital (Common Equity Tier 1 capital + Additional
          Tier 1 capital) / Total exposure; end-period basis.
       2) Auxiliary indicator until 2017, implemented as regulatory
          standard from 2018.
       3) Shaded area indicates distribution of individual banks' lever-
          age ratios.
Sources: Commercial banks' business reports.

Generally adequate liquidity response capacity

At the end of April 2021, banks' liquidity coverage ratio (LCR) dropped 0.2%p from the end of last year (95.1%) to 94.9%. This was mainly owing to a sharp rise in net cash outflows from the increase in the standby money of corporations and other financial institutions, which outpaced the growth in banks' high-quality liquid assets. Banks' LCR has, nevertheless, remained in excess of the regulatory minimum 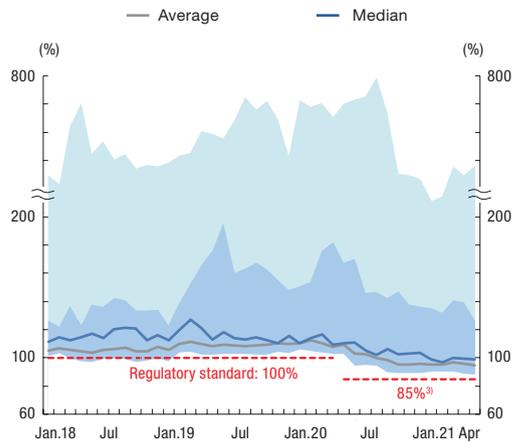(temporarily lowered from 100% → 85% for the period April 2020 through September 2021). Notwithstanding, it is important for those banks whose LCR is

currently near the temporary regulatory minimum (85%) as a result of active credit supply to prepare for its phase-out.

Figure I-5. Commercial bank LCRs[1)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
          September 2021.
Sources: Commercial banks' business reports.

At the end of April 2021, banks' foreign currency LCR[4)] inched up by 0.4%p from the end of 2020 (107.3%) to 107.7%. The foreign currency LCR exceeded the regulatory minimum (temporarily lowered from 80% → 70% for the period April 2020 through September 2021) for all banks (Figure I-6).

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3) Here, the leverage ratio means the simple Tier 1 capital ratio under the 「Banking Business Supervision Regulations」. This ratio was introduced to limit excessive leverage in the banking sector to prevent 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 standard capital adequacy requirements. In Korea, it was selected as a supplementary indicator from the first quarter of 2015 and then officially adopted as a regulatory measure in 2018. The leverage ratio also started to be applied to Internet-only banks in January 2020.

Figure Ⅰ-6. Commercial bank foreign currency LCRs[1)2)]
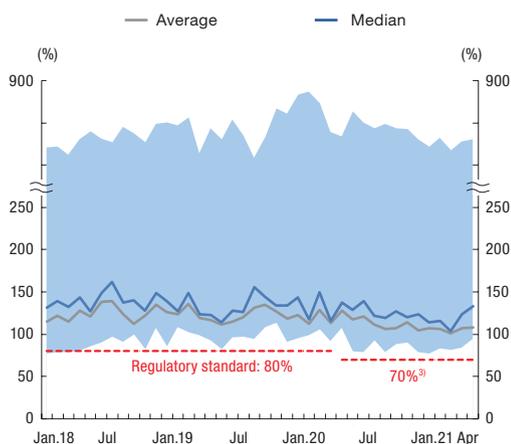
Notes: 1) High-quality liquid foreign currency assets/Total net cash outflows in foreign currency over next 30 calendar days; monthly average balance basis.
2) Shaded area indicates distribution of individual banks' foreign currency LCRs.
3) Temporary adjustment in place from April 2020 through September 2021.

Sources: Commercial banks' business reports.

Tale Ⅰ-1. Commercial bank net stable funding ratios (NSFRs)[1)2)]

(%)

	2019				2020				2021
	Q1	Q2	Q3	Q4	Q1	Q2	Q3	Q4	Q1
Average	112.1	111.2	111.2	113.5	111.7	111.6	111.1	112.2	111.2
Median	111.2	110.3	108.3	111.3	111.9	110.1	109.4	110.3	108.2

Notes: 1) Available stable funding / Required stable funding; end-period basis.
2) Regulatory standard for 2021 is 100%.

Sources: Commercial banks' business reports.

The net stable funding ratio[5)] (NSFR), measuring the long-term stability of banks' funding structure, stood at 111.2% at the end of the first quarter of 2021, with all banks satisfying the regulatory minimum (100%) (Table Ⅰ-1).

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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 region-based banks with only small amounts of foreign currency liabilities (Kwangju Bank and Jeju Bank). The regulatory standard was raised incrementally starting in 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.
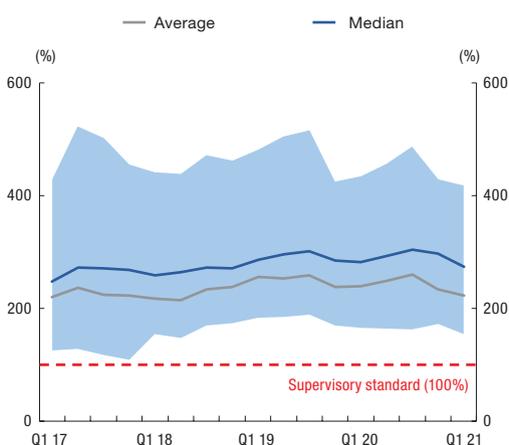
5) The NSFR limits banks' overreliance on short-term wholesale funding by requiring them to fund some of their long-term assets under management with stable debt and capital. The NSFR was introduced to domestic banks in January 2018 (2020 in the case of Internet-only banks).

2. Non-Bank Financial Institutions

Overall satisfactory level of resilience

At the end of the first quarter of 2021, the risk-based capital ratio[6] (RBC ratio) of life insurance companies, an indicator of loss absorption capacity, stood at 273.2%,[7] down by 24.1%p from the end of 2020 (297.3%), as rising market interest rates resulted in valuation losses on bonds[8] (Figure Ⅰ-7).

to 8.2% at the end of the first quarter of 2021. The provision coverage ratio fell 2.2%p from the end of 2020 (106.8%) to 104.6% on the rise in substandard-or-below loans.

The BIS capital ratio of mutual savings banks ticked lower by 0.3%p from the end of last year (14.2%) to 13.9% at the end of the first quarter of 2021,[9] while the provision coverage ratio (114.5%) climbed higher by 3.0%p from the end of last year (111.5%) (Figure Ⅰ-8).

Figure Ⅰ-7. Life insurance company risk-based capital (RBC) ratios[1]

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.
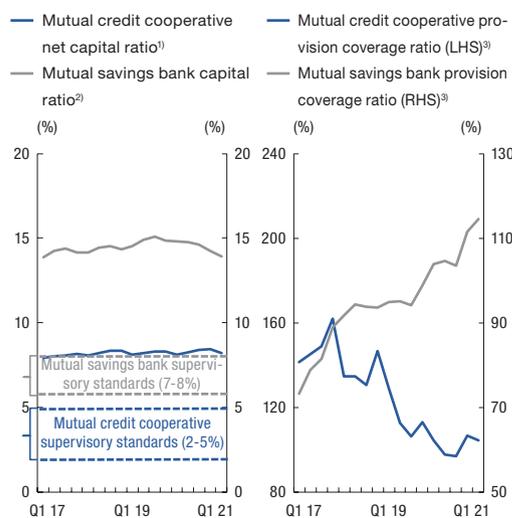Sources: Financial institutions' business reports.

The net capital ratio of mutual credit cooperatives slipped 0.2%p from the end of 2020 (8.4%)

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.

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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) At the end of the first quarter of 2021, the RBC ratio of general insurance companies dropped 9.2%p from the end of last year to 224.8%.

8) In the case of life insurance companies, bonds classified as available-for-sale securities (whose mark-to-market gains and losses are reflected in the capital account) accounted for as much as 35.0% of their total assets at the end of the first quarter of 2021, far exceeding the corresponding share among banks (7.9%) and securities companies (4.8%). Any unrealized losses on valuation of bonds, therefore, have a sizeable negative impact on life insurance companies' capital.

At the end of the first quarter of 2021, the adjusted capital ratio of credit-specialized financial companies dropped 0.3%p from the end of 2020 (18.9%) to 18.6% as an increase in the leverage limit for credit card companies led to growth in assets.[10] The provision coverage ratio for the same period stood at 324.4%, up 3.4%p from the end of 2020 (321.0%) (Figure Ⅰ-9).

Figure Ⅰ-9. Credit-specialized financial company resilience indicators
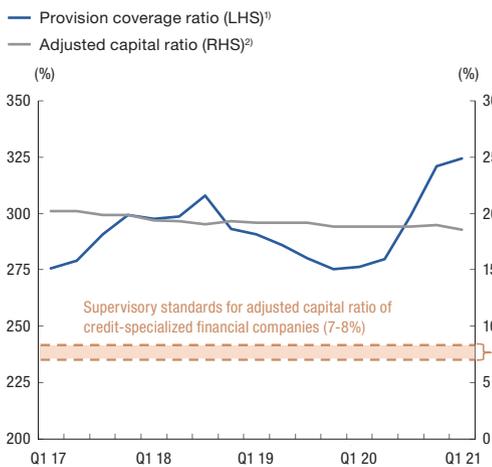
Notes: 1) Loan loss provisions / Substandard-or-below loans.
    2) Adjusted capital / Adjusted total assets; supervisory standard 7% (credit card companies 8%).
Sources: Financial institutions' business reports.

At the end of the first quarter of 2021, the net capital ratio of securities companies rose[11]

21.3%p from the end of last year (698.6%) to 719.9%, bolstered by rising securities investment income and fee income(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.
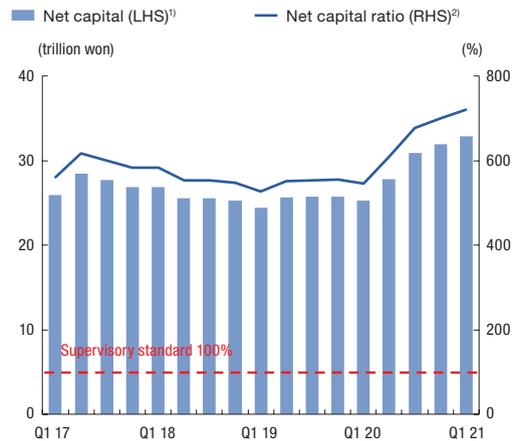Sources: Financial institutions' business reports.

NBFI resilience appears to be at an adequate level overall. However, mutual credit cooperatives and mutual savings banks are susceptible to credit risk due to their share of vulnerable borrowers, which tends to be significantly higher than that of banks. The heavy reliance of securities companies and credit-specialized financial companies on short-term wholesale funding[12] exposes them to liquidity risk and

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9) At the end of the first quarter of 2021, the risk-weighted assets of mutual savings banks (KRW 82.7 trillion) jumped 7.1%p on the increase in loans, growing at a rate faster than the growth rate of equity capital (4.6%) during the same period.

10) In September 2020, the authorities raised the maximum leverage limit for credit card companies from six times capital to eight times capital to help alleviate the financial burden associated with their entry into new business areas such as big data. As a result, the adjusted total assets of credit card companies, which correspond to the denominator of their adjusted capital ratio, increased by KRW 3.3 trillion from the end of the previous year (KRW 130.2 trillion) to KRW 133.5 trillion at the end of the first quarter of 2021.

11) At the end of the first quarter of 2021, the net operating capital of securities companies (KRW 61.0 trillion) rose by KRW 1.4 trillion from the end of 2020, while their total risk amount increased only by KRW 0.4 trillion (KRW 28.2 trillion), resulting in a gain of KRW 1.0 trillion in net capital (net operating capital - total risk amount, KRW 32.8 trillion) for the period.

therefore also demands attention. Moreover, a new capital rule with potential to increase the liabilities of insurance companies is set to take effect in the near future.[13] In order to be able to effectively respond to changes in domestic and global conditions and external shocks, financial institutions with a low loss absorption capacity need to make efforts to preemptively shore up their capital.

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12) In the case of securities companies, repos and short-term debt account for 36% (KRW 196 trillion, as of the end of 2020) of their total borrowings, making them vulnerable to liquidity risk. Meanwhile, credit-specialized financial companies rely nearly exclusively on bonds issued by credit-specialized financial companies (KRW 170 trillion, 74%).

13) The authorities are poised to introduce the Korea Insurance Capital Standard (K-ICS) in 2023, whose highlights include the mark-to-market valuation of liabilities. The entry into effect of this new scheme could result in a sharp increase in the valuation amount of insurance companies' liabilities, particularly among those companies with liabilities with long maturities, and cause a dip in their capital adequacy ratio.

II. External Payment Capacity

Korea's external payment capacity appeared generally sound.

Amid a slight decline in net external assets, the share of short-term external debt in total external debt decreased on the rapid increase in long-term external debt. The external debt-to-nominal GDP ratio, although pushed moderately higher by the rise in foreigners' portfolio investment in domestic bonds, was generally at an adequate level.

The official foreign reserves surged to a new all-time high of USD 456.46 billion at the end of May, while the ratio of short-term external debt relative to official foreign reserves showed a small drop at the end of the first quarter of 2021 (Figure II-1).

Figure II-1. Map of changes in external payment capacity indicators
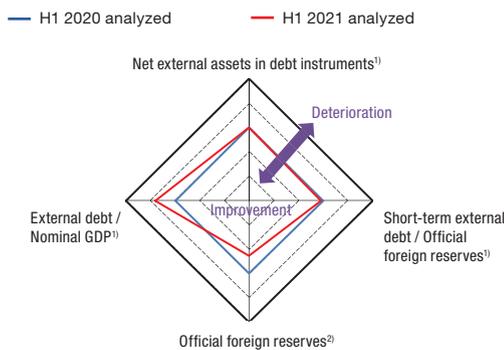
Notes: 1) Extent of change as of end-Q1 2021 compared to end-Q1 2020 indexed.
2) Extent of change as of end-May 2021 compared to end-May 2020 indexed.
Source: Bank of Korea.

Modest decline in net external assets

At the end of the first quarter of 2021, Korea's net external assets (external assets - external debt) stood at USD 464.81 billion, representing a moderate year-on-year decrease of 0.2% (-USD 1 billion) (Figure II-2).

Figure II-2. Net external assets in debt instruments[1]
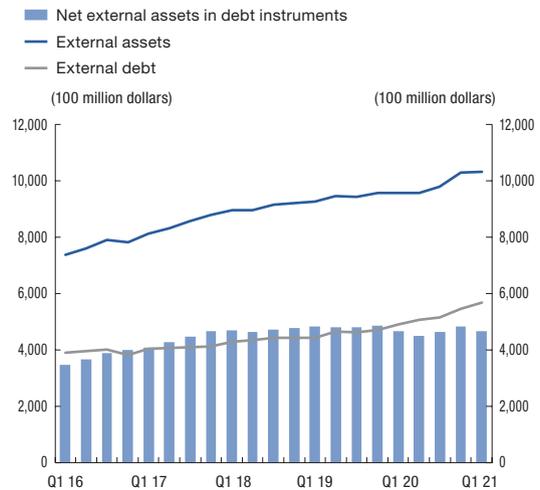
Note: 1) End-quarter balance basis.
Source: Bank of Korea.

External assets rose 7.9% (+USD 75.6 billion) year-on-year to reach USD 1,030.7 billion at the end of the first quarter of 2021.

When the change in external assets (+USD 53.5 billion) between the fourth quarter of 2020 and the first quarter of 2021 is broken down by sector, the central bank's external assets expanded by USD 26 billion on rising foreign reserves. Deposit-taking corporations' external assets were lifted by USD 11.9 billion by an increased handling of foreign currency bills bought. The external assets of other sectors also rose by USD 9.4 billion on growing foreign direct investment by general corporations.

The external assets of general government increased by USD 6.2 billion (Figure Ⅱ-3).

rect investment (Figure Ⅱ-4).

Figure Ⅱ-3. Changes in external assets in debt instruments, by sector
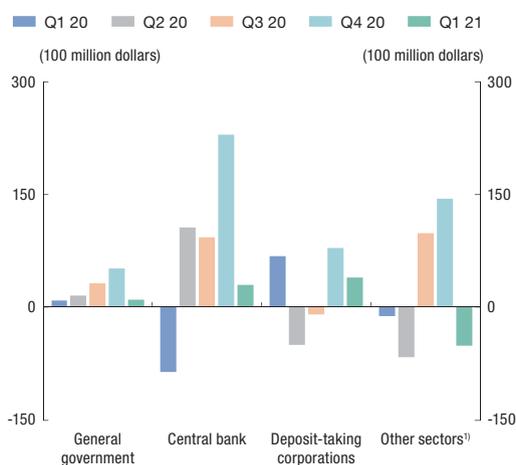
Note: 1) Including other financial corporations (securities companies, asset management companies, insurance companies, etc.) and non-financial corporations.
Source: Bank of Korea.

Figure Ⅱ-4. Changes in external debt, by sector
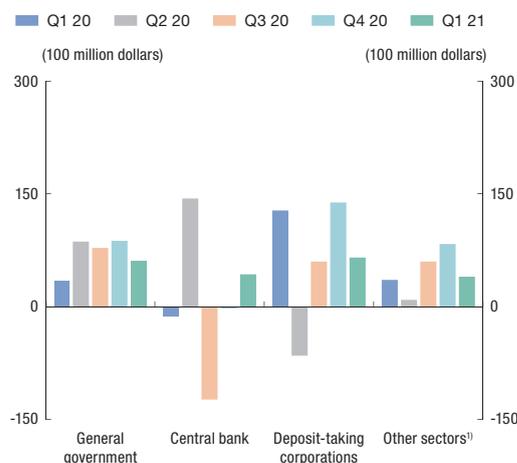
Note: 1) Including other financial corporations (securities companies, asset management companies, insurance companies, etc.) and non-financial corporations.
Source: Bank of Korea.

At the end of the first quarter of 2021, external debt reached USD 565.9 billion, a year-on-year increase of 15.7% (+USD 76.7 billion).

When the change in external debt (+USD 51.6 billion) between the fourth quarter of 2020 and the first quarter of 2021 is broken down by sector, the external debt of deposit-taking corporations increased by USD 20.4 billion on increased external borrowings by domestic branches of foreign banks. The external debt of general government and the central bank was up by USD 14.8 billion and USD 4 billion, respectively, on the back of a rise in foreigners' portfolio investment in domestic bonds. The external debt of other sectors also saw an increase of USD 12.3 billion as a result of an upsurge in the use of trade credit by general corporations and a larger inflow of foreign di-

At the end of the first quarter of 2021, the external debt-to-nominal GDP ratio stood at 33.6%, representing an increase from the same period last year (30.0%). The share of short-term external debt in total external debt fell compared to the first quarter of 2020 (30.7%) to 29.3%. The share of short-term external assets in total external assets rose from the same period a year earlier (60.4%) to 61.2% (Figure Ⅱ-5).

During 2020, short-term external debt saw a significant increase, driven by rising demand for foreign-currency funds amid the COVID-19 pandemic. However, given the nature of the external debt, the current situation should be no cause for alarm, at least for the time being. Nevertheless, related trends need to be continuously monitored for any signs of further increase.

Figure Ⅱ-5. Proportions[1] of short-term external debt and assets in debt instruments

■ External debt / Nominal GDP (LHS)
— Short-term external debt / Total external debt (LHS)
— Short-term external assets / Total external assets in debt instruments (RHS)

Note: 1) End-quarter basis.
Source: Bank of Korea.
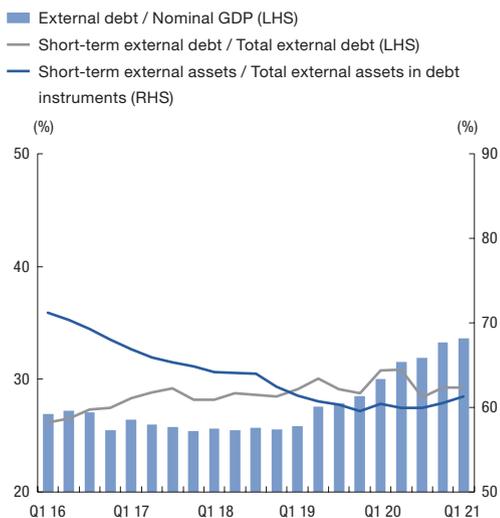
Official foreign reserves at a record high

At the end of May 2021, the official foreign reserves reached a record high level of USD 456.46 billion. This was mainly due to the combination of a steady growth in investment income from foreign currency assets and the recent weakness of the US dollar which boosted the conversion value of foreign currency assets denominated in euros, Japanese yen and other currencies (Figure Ⅱ-6).

Figure Ⅱ-6. Balance of and changes[1] in official foreign reserves

— Amount (LHS)　　■ Change (RHS)

Note: 1) Amounts at the month-ends, changes during the months.
Source: Bank of Korea.
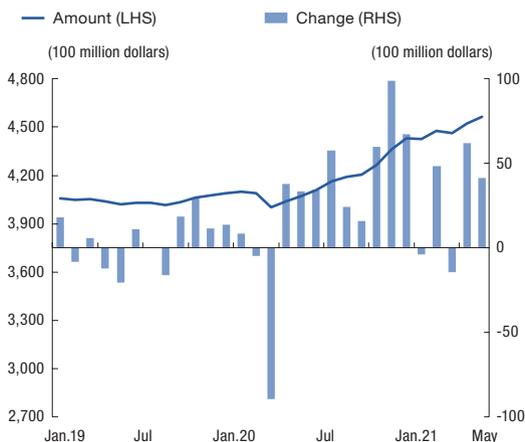
Meanwhile, the ratio of short-term external debt to official foreign reserves fell 0.5%p from the same period of last year (37.6%) to 37.1% at the end of the first quarter of 2021 (Figure Ⅱ-7).

Figure Ⅱ-7. Short-term external debt-to-official foreign reserves ratio[1]

■ Short-term external debt (LHS)
— Short-term external debt / Official foreign reserves (RHS)

Note: 1) End-quarter basis.
Source: Bank of Korea.
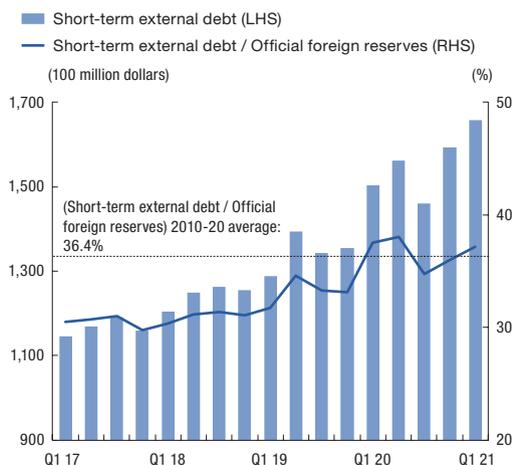
Regarding instrument composition, official foreign reserves were mainly held in the forms of marketable securities (90.7%) and deposits (6.4%) as of the end of May 2021. Securities consist primarily of highly liquid safe assets such as government bonds, government agency bonds and asset-backed securities (Figure Ⅱ-8).

Figure Ⅱ-8. Composition[1] of official foreign reserves
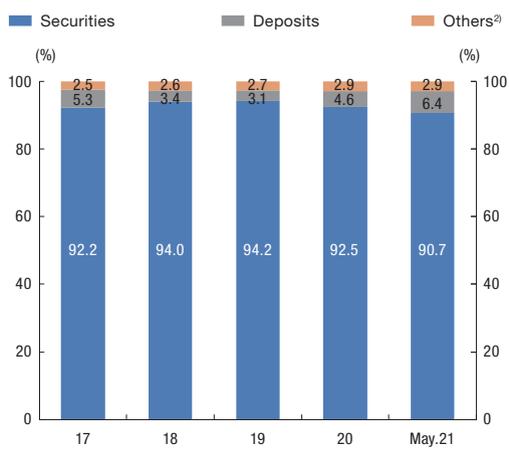
Notes: 1) End-period basis.
　　　 2) Gold, SDRs, etc.
Source: Bank of Korea.

Ⅲ. Financial Market Infrastructures

In spite of the prolonged pandemic, the value of settlement in BOK-Wire+ and other major payment and settlement systems steadily increased, driven by securities settlements by financial institutions and electronic funds transfers by individuals and companies. Settlement risk was appropriately managed and maintained at a stable level. For the continued stability of the payment and settlement systems, a sustained effort will be needed going forward to ensure their smooth functioning and the continuity of business operations.

BOK-Wire+[1]

In the first half of 2021, the daily average value of settlement in BOK-Wire+, the large value payment system providing final settlement of mutual obligations between financial institutions, reached KRW 471.7 trillion, continuing on the upward trend from last year (KRW 423.6 trillion). Settlement risk was managed at a stable level.

The maximum intraday overdraft cap utilization rate and the proportions of payment orders in queue for settlement, two indicators of the level of liquidity among BOK-Wire+ participants, stayed mostly stable during the first quarter of 2021, standing at 20.5% and 2.9%, respectively. Of the total settlement value, the portion settled near the closing time (16:00-17:30) decreased during this period to 51.9% from the same period of last year (60.3%)

(Figure Ⅲ-1).

Figure Ⅲ-1. Risk indicators related to BOK-Wire+
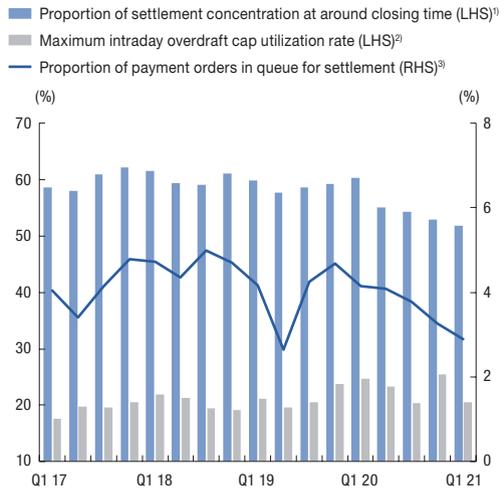
Notes: 1) Amount of settlement processed after 16:00 / Total settlement amount during the period.
2) Daily average rate of maximum utilization of participants' intraday overdraft caps.
3) Average ratio of the amount of participants' payment orders in queue for settlement / Total settlement amount (excluding payment orders in queue for liquidity savings).

Source: Bank of Korea.

During the first quarter of 2021, there was no instance in which BOK-Wire+'s operating hours were extended (Figure Ⅲ-2).

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1) The new BOK-Wire+, introducing an enhanced settlement method and a new settlement account system, was launched on October 12, 2020, at the conclusion of a development and implementation project that lasted five years, and is currently operating smoothly.

Figure Ⅲ-2. Extension of BOK-Wire+ operating hours

■ Number of extensions (LHS)
─○─ Average duration of extension (RHS)[1]
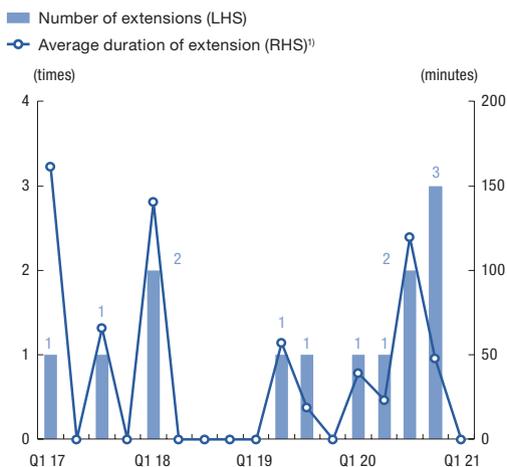
Note: 1) Total duration of extension / Number of extensions during the quarter.
Source: Bank of Korea.

Retail payment systems

In the first quarter of 2021, the daily average value of settlement in the retail payment systems operated by Korea Financial Telecommunications and Clearings Institute rose sharply from last year (KRW 80.2 trillion) to KRW 89.9 trillion on increased electronic funds transfers by individuals and companies. Related settlement risk was generally managed appropriately.

Regarding retail payment system-related risk indicators, during the first quarter, the net debit cap[2] utilization rate of net settlement participants exceeded the cautionary level (70%) 34 times, a sizeable increase from the same period of last year (20 times), due to

large amounts of funds transferred in this period in connection with IPO subscriptions and refunds. As a result, the average maximum net debit cap utilization rate was lifted slightly higher to 17.7% compared to the same period a year earlier (14.7%), but was still managed adequately (Figure Ⅲ-3).

Figure Ⅲ-3. Net debit cap utilization rate

■ Number of occurrences of net debit cap utilization rates exceeding 70% (LHS)
── Average maximum net debit cap utilization rate (RHS)[1]
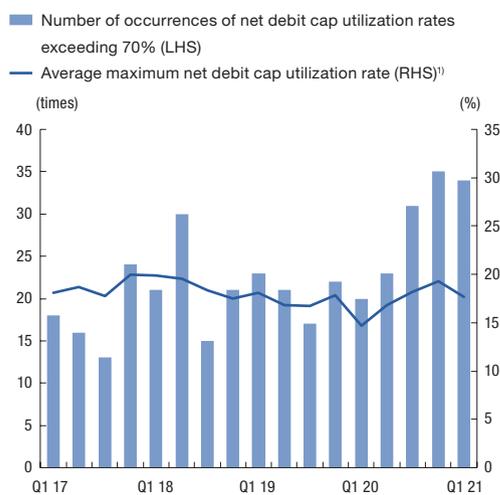
Note: 1) Average of daily maximum net debit cap utilization rates of participants during the period.
Source: Bank of Korea.

Securities settlement systems

Settlement risk was managed at a stable level in the securities settlement systems operated by Korea Exchange and Korea Securities Depository amid a continuous increase in the value of settlement. The daily average value of settlement continued the upward trend from last year (KRW 205.1 trillion) to hit KRW 214.8 trillion, driven by inter-institutional repo

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2) In the retail payment systems, including the CD Network System, the Interbank Remittance System and the 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, to control related net settlement-related risks in the retail payment systems, the Bank of Korea requires participants to independently establish ceilings (net debit caps) on their own unsettled net debit positions.

transactions and transactions in stocks and bonds.

During the first quarter of 2021, the settlement of all exchange transactions in stocks and government bonds was completed by their respective deadlines (16:00, 17:00). Some OTC stock transactions by institutional investors were settled past the deadline (16:50), but the frequency (twice) remained low (Table Ⅲ-1).

Table Ⅲ-1. Proportions[1] of securities settlement completed after the deadline

	Penalty deadline[2]	Proportions (%)				
		2020				2021
		Q1	Q2	Q3	Q4	Q1
Exchange-traded stocks	16:00	-	-	-	-	-
Exchange-traded government bonds	17:00	-	-	-	-	-
Institutional investors for OTC stocks	16:50	-	-	-	-	0.0001

Note: 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 stayed at stable levels of 1.6% and 6.1%, respectively, during the first quarter of 2021 (Figure Ⅲ-4).

Figure Ⅲ-4. Shares[1] of FOP settlement
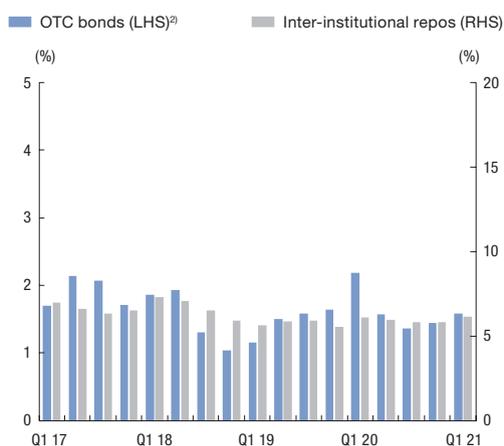
Notes: 1) Proportion in total settlement amount (of OTC bonds and inter-institutional repos) of settlements not processed through DvP (delivery-versus-payment) system.
  2) Based on final settlement after deduction of linked settlements.
Source: Korea Securities Depository.

Foreign exchange settlement systems[3]

During the first 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] increased from last year (USD 62.84 billion) to USD 68.70 billion.

Amid a continuously high share of 74.7% accounted for by PvP settlements processed through the CLS system, foreign exchange transaction-related settlement risk appears to have remained stable during the first quarter

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3) Foreign exchange settlements are conducted through the interbank correspondent network, the PvP system operated by CLS Bank and the 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.

of 2021 (Figure Ⅲ-5).

Figure Ⅲ-5. Settlement amount[1] and proportion[2] made through the CLS system

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■ CLS settlement amount (LHS)
— Proportion of CLS settlement (RHS)
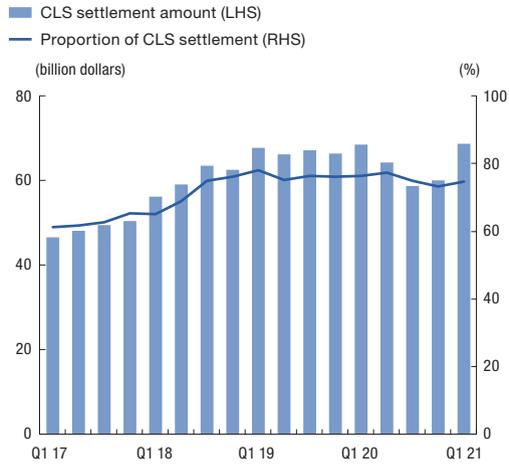
Notes: 1) Daily average amount of transactions made by domestic
banks and foreign bank branches during the quarter.
2) Proportion in total CLS eligible FX transactions (of domestic
banks and foreign bank branches) of those settled through
the CLS system,
Source: Bank of Korea.

Overall Assessment

Despite signs of a resurgence of COVID-19, Korea's financial system has remained generally stable, with the real economy embarking on a gradual path of recovery as support measures by the policy authorities continue. In financial markets, interest rates and stock prices have been buoyed by the expectation for economic recovery, and volatility has remained low. With regard to financial institutions, their asset soundness and loss absorption capacity remain robust, allowing them to effectively carry out their role as financial intermediaries.

However, amid continuously accommodative financial conditions, investors' risk appetite has strengthened, and the increased supply of private credit has driven up asset prices, causing financial imbalances to worsen. All this has, in fact, increased potential vulnerabilities within the financial system in the medium and long term. Although the financial stability index (FSI) is currently showing a downward stabilization trend, the financial vulnerability index[1] (FVI), measuring overall financial system vulnerability, has continuously risen to reach 58.9 in the first quarter of 2021, above the pre-pandemic level of 41.9 in the fourth quarter of 2019.

Financial Vulnerability Index (FVI)[1]
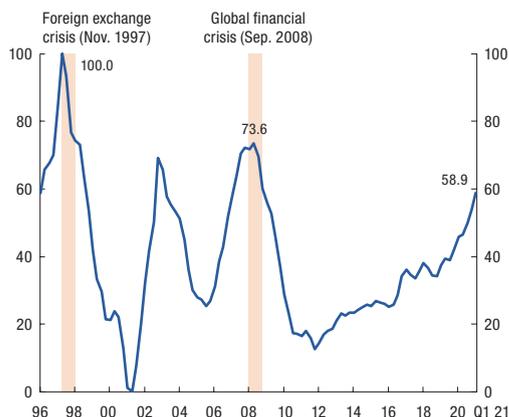
Note: 1) A composite index (0-100) calculated by standardizing 39 indicators related to three valuation factors (asset prices, credit accumulation and financial institutional resilience).

Source: Bank of Korea.

Assessment of Vulnerabilities

By sector, in the credit markets, both household and corporate credit have continued to grow at a fast pace. Even though real economic recovery has been gaining steam in Korea and around the world, the improvement in household income has been rather slow, resulting in a worsening of the debt service burden for households. The debt service burden has become particularly heavy for self-employed business owners, frequently small businesses in the service sector requiring face-to-face interactions with customers, whose income has dropped while their debt has increased. As for corporates, although their financial conditions have generally improved, the disparity among the debt servicing capacities of corporations has widened.

In the asset markets, as the start of COVID-19

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1) For further details on this issue, refer to <Analysis of Financial Stability Issues> 「Ⅰ. Financial Vulnerability Index (FVI): New Compilation Results and Implications」(page 131).

vaccination in Korea and around the world and the government's economic support policy strengthen expectations for economic recovery, and investors' risk appetite and search for yield reach new heights, asset prices have been surging across asset classes, including stocks and real estate. The asset price hike, compounded by an increasing use of loans to fund investment, is contributing to the worsening of financial imbalances. Of the component items of FVI (asset price, credit accumulation and financial institutions' resilience), asset prices[2] were found to be the most important contributing factor to the recent increase in the potential vulnerability within the financial system.[3]

As for financial institutions, their asset soundness has remained satisfactory overall, with loan delinquency rates staying low throughout the unfolding of the COVID-19 pandemic. Meanwhile, with capital ratios largely in excess of regulatory standards, financial institutions also score high on the resilience front, as they appear to have more than sufficient capital buffers against a domestic or external shock. However, given that this is in large part thanks to accommodative financial measures undertaken by the government and financial institutions themselves, depending on future developments, the possibility an increase rise in defaults, especially on loans supplied since the COVID-19 outbreak as part of the concert-

ed effort to ease its economic impact, causing a deterioration in both their asset soundness and resilience cannot be ruled out.

Risk Factors

To sum up, although the resilience of the Korean financial system against shocks continues to be high, accumulated financial imbalances from credit accumulation and the asset price hike have increased the possibility that the negative impact of a domestic or external shock could become amplified into a systemic risk.[4] Another major risk factor for the real economy and the financial system is a potential new wave of COVID-19 cases, caused by new variants that are resistant to currently available vaccines. A worsening in the COVID-19 situation could rapidly lead to delinquency and default on household and corporate loans, by deteriorating employment and income conditions and reducing sales by companies and small businesses. Finally, the tapering off of quantitative easing policies by major countries on inflation concerns could bring about a situation similar to the taper tantrum of 2013, characterized by heightened volatility in capital flows as well as in the financial markets.

Response Measures

In order to mitigate the negative impact of a

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2) Of the three component items of FVI, the total asset price index showed a particularly large increase from 58.4 in the fourth quarter of 2019 to 91.7 in the first quarter of 2021. This result is attributable to the strengthening in the search for yield in the stock and real estate market amid a decrease of risk aversion to pre-pandemic levels in the corporate bond market. The rise was particularly marked for the real estate price index which reached the highest value of 100.

3) In spite of the recent massive growth in household and corporate credit, the total credit accumulation index of FVI increased marginally from 27.4 in the fourth quarter of 2019 to 30.3 in the first quarter of 2021 as its upward movement was hindered by the tightening of regulations by the government and the soundness of the external sector.

4) For a further discussion on this subject, refer to <Analysis of Financial Stability Issues> 「II. The Impact of Accumulated Financial Imbalances on the Financial System」(page 141).

domestic or external shock, it is necessary to reduce financial imbalances and other vulnerabilities within the financial system. The first step in this direction will be to make sustained efforts to manage private credit and stabilize asset markets. In the current situation where a high degree of COVID-19-related uncertainty persists concomitantly with large financial imbalances, depending on how the pandemic develops, both a premature and delayed end to relief schemes could have undesirable consequences. It would be, therefore, wise to unwind these temporary relief measures gradually, taking into consideration the progress in economic recovery. Also, a selective approach should be adopted so that support is targeted to industries that are most severely impacted by the pandemic. This could be a way to prevent the problem of overly broad liquidity measures causing borrowers to become excessively indebted. Business conditions among the self-employed and small businesses must be closely monitored to fine-tune relief measures at appropriate times. Meanwhile, financial institutions must keep a watch on funding conditions and debt servicing capacities in the private sector, where indebtedness has sharply increased, and set aside loan loss provisions and build up capital buffers to respond to any rise in default risk.

Attention must be also paid to the possibility of heightened volatility in asset prices, which could occur if a change in economic and financial conditions in Korea and around the world causes investor sentiment to suddenly deteriorate. Price trends across asset classes, including real estate and stocks, as well as funds inflows into various asset markets, must be more closely monitored and, if necessary, efforts must be made for a joint response with relevant policy authorities.

Lastly, stepped-up efforts are needed to assess other risk factors, such as climate change risk,[5] crypto-assets,[6] cyberattacks, and big tech companies' expansion into new industries,[7] which could pose a threat to the stability of the financial system in the medium and long term, and prepare response measures, even if it is too early to precisely determine the impacts of such risks. In particular, regarding the crypto-asset market which recently saw an upsurge in trading, the flow of funds into and out of related bank accounts must be monitored while closely cooperating with policy authorities, in order to assess the risk this presents to the stability of the financial system.

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5) For more on this issue, refer to <Box 7> 「Bank Stress Test to Measure Transition Risk From Climate Change」(page 118).

6) For further details, refer to <Box 8> 「The Impact of Crypto-Assets on the Stability of the Financial System」(page 123).

7) The Financial Stability Board (FSB) called these four risk factors "emerging challenges" to the stability of financial systems.

Box 7.

Bank Stress Test to Measure Transition Risk From Climate Change

The Intergovernmental Panel on Climate Change (IPCC)[1] stated that the average temperature of the Earth is on course to rise by 3.2℃ to 5.4℃ compared to pre-industrial levels (1850-1900) in 2100, if greenhouse gas emissions continue to increase at the current rate. The international community recognized the urgency of the climate change issue and adopted the Paris Agreement[2] in 2015 to limit the increase in global temperature to well below 2.0℃, preferably below 1.5℃. To achieve the temperature goal, 196 parties signed the Paris Agreement try to curb greenhouse gas emissions. Korea also made efforts to accelerate the transition to a low-carbon economy by establishing the "2050 Carbon Neutral Strategy."

Transition to a low-carbon economy, while reducing the physical damage caused by climate change such as extreme weather events, has a negative impact on industries that generate high levels of carbon emissions (hereafter, "transition risk"). In particular, as Korea is highly dependent on carbon-intensive sectors such as steel and chemicals, its transition risk is likely greater than that of other countries. Hereunder, the impact of transition risk on the real economy and banking system are derived through a stress test.

Transmission channels of transition risk

Efforts to reduce greenhouse gas emissions toward achieving a low-carbon economy will likely raise production costs and reduce profits for carbon-intensive firms, leading to an increase in default rates and a decline in stock prices. This could translate to losses for financial institutions that hold financial assets (loans, bonds, and stocks) of those firms vulnerable to transition risk. Furthermore, if the shock from transition risk is too severe for an individual financial institution to handle, it could become systemic risk, thus negatively impacting overall financial stability.

On the other hand, the development of low-carbon technologies, such as renewable energy technologies, could help reduce the cost of greenhouse gas emissions, thus mitigating transition risk.

Pathways of transition risk

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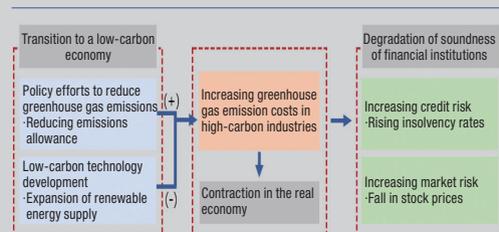
1) IPCC is established by the United Nations Environment Programme (UNEP) and World Meteorological Organization (WMO) in 1988 to identify the scientific evidence of climate change.

2) The Paris Agreement is an agreement on climate change that was adopted in 2015 by representatives of 196 state parties at the 21st Conference of the Parties of the United Nations Framework Convention on Climate Change (UNFCCC). The signatories to the agreement are required to set their own goals for reducing greenhouse gas emissions in order to keep the increase in the global average temperature well below 2.0°C (preferably below 1.5 °C) relative to pre-industrial levels.

Stress test scenarios and assumptions

This section outlines stress test scenarios in more detail. The scenarios build on the transition pathways recently developed by the Network for Greening the Financial System (NGFS).[3] The scenarios include the pathways for greenhouse gas emissions and emission prices to achieve the goals of the Paris Agreement. Two scenarios set in this stress test are as follows:[4] Scenario I, where the increase in the average global temperature is limited to 1.5 to 2.0℃ above pre-industrial levels, and Scenario II, where the increase in the average global temperature is limited to less than 1.5℃ by achieving carbon neutrality by 2050.

It was assumed that greenhouse gas emissions decrease gradually from 2021 to 2050. Scenario I assumed that Korea's greenhouse gas emissions fall from 670 million tons[5] in 2020 to 200 million tons in 2050, and to achieve this, the price of greenhouse gas emissions rises to KRW 307,000 per ton by the end of 2050. Scenario II assumed that Korea's greenhouse gas emissions are reduced to net-zero around 2050, with the price of greenhouse gas emissions soaring to KRW 830,000 per ton at the end of 2050.[6]

Furthermore, it was assumed[7] that the government uses the emission trading scheme (ETS) to follow the NGFS' greenhouse gas emissions pathways. The reference time of the stress test was set[8] as the end of December 2020, and it was assumed that, for the subsequent 30 years, the structure of financial assets held by banks and the input-output structure between industries remain unchanged from the level seen at the reference time.

3) The NGFS is an international organization established in 2017 to promote climate risk-related tasks of central banks and supervisors. In June 2021, the NGFS presented climate scenarios based on the Integrated Assessment Models (IAM) it has developed to support the climate change risk assessment of each nation. Among the IAM results of the NGFS climate scenarios, this section focused on the results of the GCAM (Global Change Analysis Model), and used them as major scenarios.

4) The NGFS presented three transition pathways: orderly transition, disorderly transition, and "hot house world." It also produced six scenarios by imposing two scenarios (average global temperature rise of 1.5℃ to 2.0℃ and less than 1.5℃) for each pathway (note that the hot house world pathway used different criteria). This analysis used two scenarios under the orderly transition pathway.

5) Among the six major greenhouse gases (CO_2, CH_4, N_2O, HFCs, PFCs, and SF_6), CO_2 emissions were used for this analysis.

6) This scenario shows the extent of greenhouse gas emission reduction and the pathways of emissions prices necessary to achieve the goals of the Paris Agreement. These pathways are subject to change depending on the stringency of government policy going forward and the pace of technology development.

7) To achieve the greenhouse gas emission targets, an emission trading scheme (ETS) may be introduced, and a carbon tax can be levied to the extent necessary to achieve the targets. It was assumed that, as Korea uses the ETS as the principal means of reducing greenhouse gas emissions, it will achieve the NGFS' greenhouse gas emission pathways through emission allowance control and the ETS.

8) Data on the financial sector (financial assets, capital adequacy ratios of banks, etc.) and GDP were based on 2020 data, input-output tables on 2018 data, and greenhouse gas emissions and financial information of companies on 2019 data. As for greenhouse gas emissions by company, the data of the National Greenhouse-gas Management System (NGMS) of the Ministry of Environment was used, and for corporate financial data, the KIS-Value data of the NICE Information Service Co., Ltd. was used.

Pathways of greenhouse gas emissions in Korea during 2020~50

Scenario 1 —— Scenario 2 ——

(Hundred million tCO$_2$)   (Hundred million tCO$_2$)
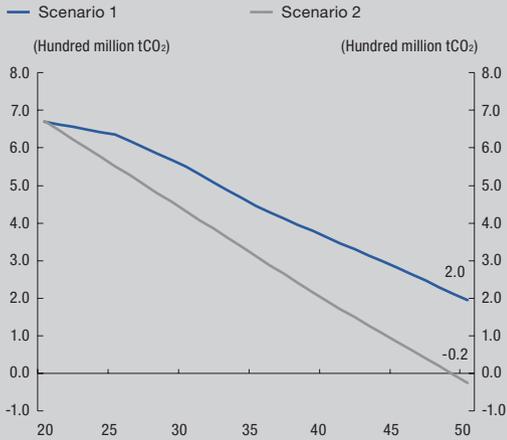
Source: NGFS.

Pathways of greenhouse gas emission prices in Korea during 2020-50

Scenario 1 —— Scenario 2 ——

(10 thousand won / tCO$_2$)   (10 thousand won / tCO$_2$)
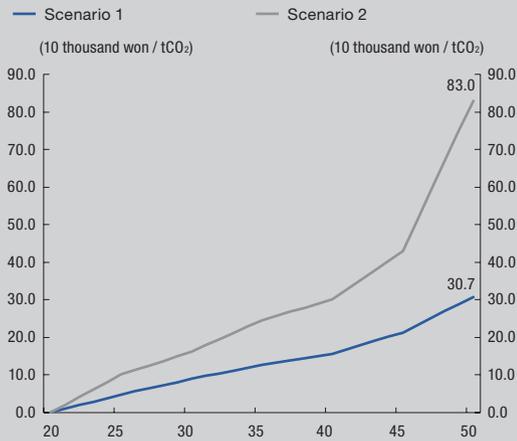
Source: NGFS.

Stress test methodologies

Based on the scenarios and the transmission channels of transition risk presented above, the stress test estimated the impact of transition risk on Korea's GDP and the capital adequacy ratios of domestic banks (BIS capital adequacy ratio, hereafter "BIS ratio") for the period from 2021 to 2050.

The impact on GDP was estimated by calculating the change of value added associated with the change of direct and indirect emission costs of firms subject to regulations for greenhouse gas emissions.[9] The impact on the BIS ratio was measured by calculating the change in banks' financial asset (loans, bonds, and stocks) values which is caused by changes in default rates and profitability of their corporate counterparties.

Results of stress test

The GDP loss by 2050 due to transition risk was estimated to range from 2.7% (Scenario 1) to 7.4% (Scenario 2) of the GDP recorded in 2020. The annual average GDP loss was 0.09% (Scenario 1) to 0.25% (Scenario 2). In Scenario II, the GDP loss rises sharply after 2040 owing to the rapid increase in the marginal abatement cost of greenhouse gas emissions in carbon-intensive industries.

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9) Of the 1,088 companies subject to regulations for greenhouse gas emissions (685 firms for the Emission Trading Scheme (ETS) and 403 firms for the greenhouse gas Target Management System (TMS)), 861 firms (566 firms for the ETS and 295 firms for the TMS) whose data for greenhouse gas emissions and financial information is available were selected for the analysis.

GDP loss due to transition risk from climate change
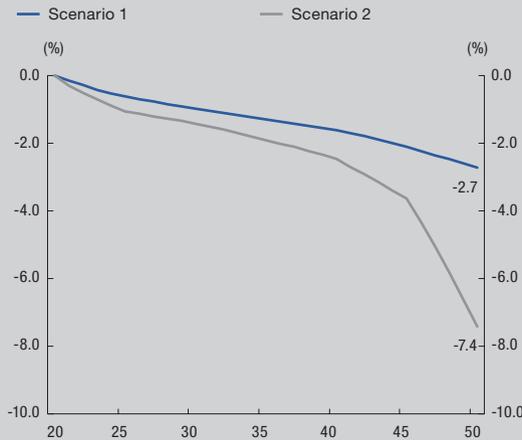
Notes: 1) Percentage of transition risk losses relative to GDP in the base year(2020)

The BIS ratio changes[1)2)] of domestic banks due to transition risk from climate change
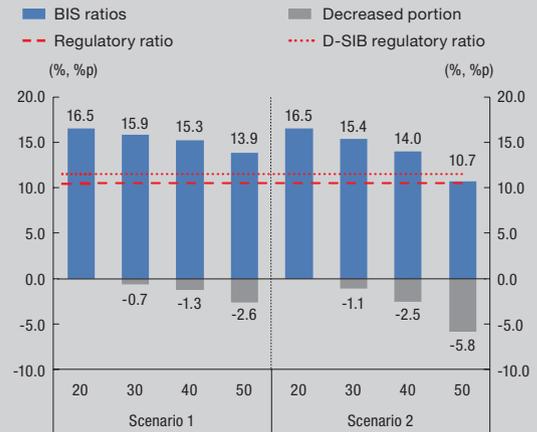
Notes: 1) Regulation criteria is 10.5% (D-SIBs 11.5%).
2) Reference time is end-Dec 2020.

Meanwhile, the BIS ratios of domestic banks as of 2050 fall by 2.6%p (Scenario 1) to 5.8%p (Scenario 2) from the reference level of 2020, as the value of the financial assets of carbon-intensive firms declines. The annual decrease in the BIS ratios of domestic banks was 0.09%p (Scenario 1) to 0.19%p (Scenario 2).

In Scenario I, in the transition toward a low-carbon economy, the BIS ratios of domestic banks are likely to stay above the regulatory level (10.5%) through 2050, while in Scenario II, the BIS ratios fall to around the regulatory level (10.5%) by 2050. This is attributed to the rapid increase in default rates and the decline of stock prices of carbon-intensive firms from 2040.

Overall assessment

Transition to a low-carbon economy reduces physical risks, such as extreme weather events and natural disasters, but efforts to mitigate greenhouse gas emissions boost transition risk, particularly for carbon-intensive industries. The results of the stress test[10] showed that the negative impact of transition risk on Korea's real economy and bank soundness is expected to increase rapidly after 2040, when the marginal abatement cost of greenhouse gas emissions increases sharply. Furthermore, if the growing trend of reducing investment in carbon-intensive firms creates difficulties for banks in liquidating related loans and investment assets, the deterioration of bank soundness will likely be more severe.

---

10) To analyze the real effects of climate-related risks on the economy, both physical and transition risks need to be considered. However, due to the lack of data, this stress test analyzed only transition risk associated with greenhouse gas emission reduction.

However, this analysis was based on the assumption that carbon capture, utilization, and storage (CCUS) technology[11] becomes gradually available for commercial application from 2035. Therefore, if the development of such technology accelerates, the negative consequences of transition risk may prove to be less severe than initially expected. In addition, this analysis assumed that the input-output industrial structure within an economy remains unchanged from the current level for the next 30 years, and that banks hold fixed balance sheets over the time horizon.

Given this, to minimize the negative effect of transition risk on the real economy and financial stability, the country's reliance on carbon-intensive industries needs to be reduced gradually through industrial restructuring and the development of emission reduction technologies such as CCUS should be accelerated.

Furthermore, to maintain the stability of the banking system, banks need to respond preemptively to transition risk through establishing a risk management system that incorporates climate change risks and promoting ESG investment.[12] In addition, to encourage the integration of transition risk assessment into investment decisions, efforts to build institutional infrastructure need to be strengthened through the revision of related laws and regulations, the standardization of the environmental information assessment and disclosure system, and the establishment of a green taxonomy.[13]

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11) CCUS technology is a emissions-reduction technology that involves the capture of CO_2 from emitters (carbon capture), the use of captured CO_2 in a range of applications (utilization), and the permanent storage of CO_2 in underground formations (storage)

12) "ESG" stands for "Environment, Social, and Governance." ESG investing refers to investment in financial products based on consideration of such non-financial factors as well as financial factors.

13) The green taxonomy is a system for classifying economic activities into green activities (e.g., climate change mitigation and adaptation) and non-green activities.

Box 8.

The Impact of Crypto-Assets on the Stability of the Financial System

Since the fourth quarter of 2020, the prices and trading volume of crypto-assets have risen by large margins, and financial products related to crypto-assets have been launched,[1] showing remarkable growth of global crypto-asset markets. Given the higher volatility of crypto-asset prices due to the uncertainty over their economic value, there is growing concern that if crypto-asset markets continue growing, they could pose a risk to financial stability. Hereunder, the trend of crypto-asset markets at home and abroad and the impact of crypto-assets on the financial system are examined.

Recent development of crypto-asset markets[2]

(Global market)

The price of Bitcoin, the leading crypto-asset, was USD 37,333 as of the end of May 2021. The cryptocurrency plunged from its peak (USD 63,503 on April 13) due to the deterioration of investor sentiment and possible move of China to tighten cryptocurrency regulations, but it remains significantly higher than the price seen during the third quarter of 2020 (average of USD 10,634). The trading value (daily average) of Bitcoin doubled to USD 65.7 billion in the period from January to May 2021, rising from USD 32.2 billion in 2020.

Meanwhile, the price volatility of Bitcoin[3] was 3.6% during the period from January to May 2021, having increased significantly from the 2.3% recorded in 2020.[4]

While the actual value of crypto-assets is difficult to measure due to the absence of rational standards with which to assess them, crypto prices have repeatedly and dramatically fluctuated following remarks made by some celebrities and introduction of government regulations.

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1) "Purpose Bitcoin ETF," the world's first Bitcoin ETF, was listed on the Toronto Stock Exchange (TSX) on February 18, 2021. The US Securities and Exchange Commission (SEC) is also considering the approval of Bitcoin ETFs for listing.

2) Bitcoin accounts for about half (44%, or USD 699.0 billion) of the market capitalization of all crypto-assets (USD 1,597.8 billion, as of end of May 2021), and its data is more reliable than that of other crypto-assets. Therefore, this analysis focused on Bitcoin.

3) Monthly average of daily percent change (the absolute value of (closing price today/closing price previous day-1)× 100).
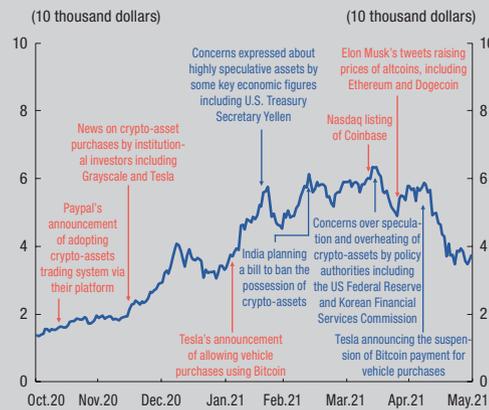
4) Recent price volatility (January to May 2021) is lower than that of the sharp fluctuations (5.3%) observed in the past (November 2017 to February 2019).

Global market indicators for Bitcoin

Legend: Trading value (RHS), Price volatility, Price (LHS), Market capitalization (RHS)

(10 thousand dollars) (100 million dollars) (%) (%)

Source: Coinmarketcap.

Key events related to crypto-assets and price changes of Bitcoin

(10 thousand dollars) (10 thousand dollars)

- News on crypto-asset purchases by institutional investors including Grayscale and Tesla
- Paypal's announcement of adopting crypto-assets trading system via their platform
- Tesla's announcement of allowing vehicle purchases using Bitcoin
- Concerns expressed by some key economic figures including U.S. Treasury Secretary Yellen
- India planning a bill to ban the possession of crypto-assets
- Concerns over speculation and overheating of crypto-assets by policy authorities including the US Federal Reserve and Korean Financial Services Commission
- Elon Musk's tweets raising prices of altcoins, including Ethereum and Dogecoin
- Nasdaq listing of Coinbase
- Tesla announcing the suspension of Bitcoin payment for vehicle purchases

Source: Coinmarketcap.

(Domestic market)

The trading value (daily average) of Bitcoin in the domestic market jumped from KRW 128.1 billion in 2020 to KRW 623.4 billion during January to May 2021, with the share in the global market rising as well, from 2.9% to 4.3%.

Meanwhile, based on global market capitalization and the number of domestic virtual accounts,[5] the market capitalization of domestic crypto-asset markets is estimated[6] to be about KRW 50 trillion.

Trading value[1] and share[2] of Bitcoin in the domestic market

Legend: Trading value (LHS), Share (RHS)

(100 million won) (%)
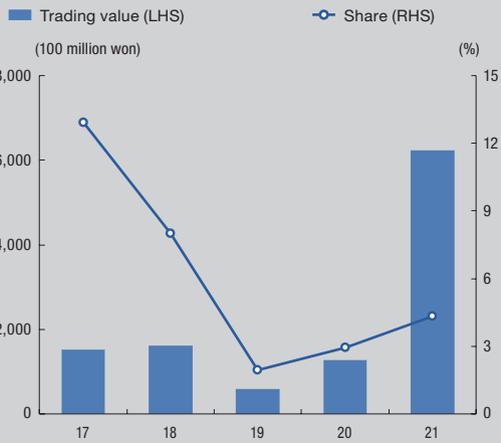
Notes: 1) Transaction amount (daily average) through 11 domestic exchanges, including Bithumb.
2) Domestic transaction volume / global transaction volume (based on major currencies).
Source: Cryptocompare.

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5) The number of accounts with domestic crypto-asset exchanges (real name of accountholder identified) rose sharply from 1.336 million at the end of 2020 to 2.502 million at the end of February 2021.
6) It is important to measure the size of domestic crypto-asset markets in order to identify the path via which crypto-asset price volatility is transmitted to the financial system. However, as related data is not disclosed, the market capitalization of domestic crypto-asset markets was estimated using the following two methods:

Method 1: global market capitalization × share of transactions in Korean won among Bitcoin trading value = KRW 1,775 trillion × 3.0% = KRW 53.2 trillion (end of May 2021)

Method 2: Σ_i(cryptoasset virtual accounts newly opened at T_i × average investment amount (about KRW 5 million) ÷ average Bitcoin price at T_i) × current Bitcoin price (end of May 2021) = KRW 45.1 trillion (end of May 2021)

Impact of crypto-assets on the financial system

Despite the vulnerability of crypto-assets, whose prices fluctuate dramatically regardless of real economic conditions, crypto-asset markets can surge substantially, driven by speculative demand seeking price gain. This can negatively impact the financial system through various channels.

In the event of a crypto-asset prices plunge, financial institutions with exposure to crypto-assets and related financial products such as loans to crypto-asset investors would likely see their asset quality deteriorate (financial institution exposure channel).

As for investors, despite the growth of crypto-asset markets and increase in investment opportunities through the emergence of related financial products, due to the uncertainty[7] over the economic value of crypto-assets, their investment losses would increase, negatively impacting the real economy, such as through a contraction in consumption (investment loss channel). Also, a sharp decline of the prices of financial products related to crypto-assets would likely amplify volatility across the financial markets (market channel).

Channels through which risks in crypto-asset markets spread to financial system
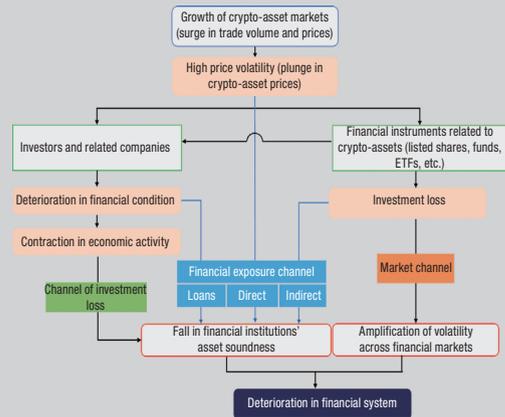
(Channel of financial institution exposure)

Under the current situation, the exposure of domestic financial institutions to crypto-assets is very limited, and thus the risk of losses for financial institutions after a sudden fall of the price of crypto-assets is estimated to be not substantial.

Domestic financial institutions are not permitted[8] to purchase crypto-assets directly, and the market capitalization of domestic companies[9] related to crypto-assets is only KRW 3.7 trillion (end of May 2021). Also, no crypto-asset financial products have been launched. While there are a greater number of crypto-asset companies and diverse financial products overseas, the value of investment in such products held by domestic investors or financial institutions is estimated to be insignificant.[10]

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7) The Bitcoin price jumped on the news that Tesla cars could be bought with Bitcoin and plunged when Tesla halted such transactions, demonstrating that the uncertainty over the economic value of crypto-assets is still significant.

8) The government banned financial institutions from holding, purchasing, or accepting crypto-assets as collateral and stopped investment in shares of companies related to crypto-assets over concern that new investment of financial institutions would not stimulate investment sentiment (December 13, 2017).

9) The majority of these are companies that hold shares of cryptocurrency exchanges, and they exclude companies related to crypto-assets whose crypto-assets do not make up an insignificant portion of their business.

10) Of the top 20 overseas stocks net purchased by domestic investors from January to May this year, there were no cryptocurrency exchanges or companies that invest in crypto-assets and ETF. In addition, overseas stocks held by domestic banks account for only 0.02% of total assets.

Furthermore, it is estimated that the loan exposure of financial institutions to crypto-asset-related businesses or investors is not significant. For instance, loans from financial institutions to domestic, crypto-asset-related, listed companies stood at KRW 0.3 trillion as of the end of 2020, accounting for 0.1% of all loans to listed companies (KRW 202.9 trillion). Moreover, from January to April 2021, other loans of banks grew at a faster pace than in the same period of the previous year; however, excluding temporary factors such as stock subscription funds, the growth of other loans is not large, and investor deposits with securities companies remain at about KRW 60 trillion.[11] This suggests that loans extended by financial institutions for investment in crypto-assets have not increased much and that there is no visible sign that stock investment funds obtained through loans have not[DB1] moved to crypto-asset markets.

Changes in loans from domestic banks and trends in stock market-related funds

Sources: Bank of Korea, Korea Financial Investment Association.

(Channel of investment loss[12])

Currently, the losses of individual investors from a sudden fall of crypto-assets would be unlikely to negatively affect the financial sector or the economy. The market capitalization of crypto-assets is about 1.0% of household financial assets, and if crypto-assets were to fall by the same margin seen during the plunge in 2018,[13] the market capitalization would likely decrease by a maximum of KRW 34 trillion. This is very small compared with the market capitalization declines during sharp plunges in stock prices in the past.[14] However, it should be noted that because investments in crypto-assets can be made in smaller amounts than investments in real estate and such investments are made mostly by younger people who have a weaker income base and higher risk appetite as an alternative form of investment in response to rising real estate prices, the shock from investment losses would be concentrated among such younger people.

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11) The value of equity investment funds reached KRW 84 trillion as of the end of May 2021, the highest level this year.

12) Since prices of some cryptocurrencies traded only domestically are highly volatile, in the case of a rapid increase in investment in such cryptocurrencies, investment losses could be larger than the analysis results of this section show.
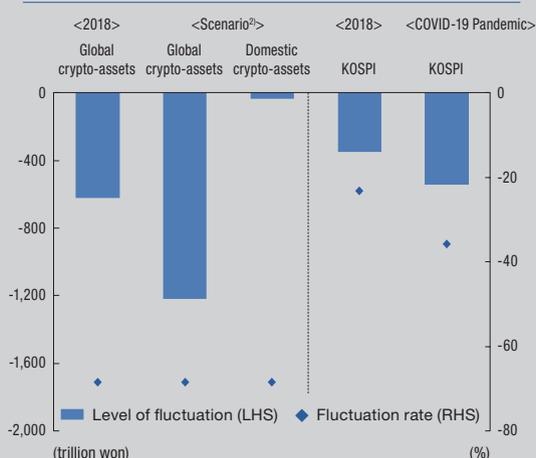
13) In 2018, the Bitcoin price plunged 68.5% from its peak.

14) In 2018, when stock prices fell the most in the last 10 years (except 2020), the KOSPI lost KRW 351 trillion in market capitalization, and in March 2020, it lost KRW 544 trillion in market capitalization due to COVID-19.

Fluctuations¹⁾ in market capitalization of asset markets

<2018>	<Scenario²⁾>		<2018>	<COVID-19 Pandemic>
Global crypto-assets	Global crypto-assets	Domestic crypto-assets	KOSPI	KOSPI

Level of fluctuation (LHS)   ◆ Fluctuation rate (RHS)

(trillion won)   (%)

Notes: 1) Comparison for levels and rates of fluctuations of the lowest point against the highest point in market capitalization for the asset market at each period.
2) Assuming market capitalization (as of May 2021) falls at the same rate as the 2018 crypto-asset price plunge.
Sources: Bank of Korea, coinmarketcap, Korea Exchange.

(Market channel)

Fluctuations in the prices of financial products related to crypto-assets appear to be limited in their capacity to increase volatility across financial markets. The market capitalization of companies related to crypto-assets (KRW 3.7 trillion) accounts for merely 0.1% of the aggregate market capitalization of shares listed on domestic stock exchanges (KRW 2,655 trillion). Hence, a sharp decline of their shares would not shock the overall stock market significantly.

Implications

Recent crypto-asset price fluctuations are largely attributed to the rapid surge of speculative demand seeking price gains, while the econom-

ic value of crypto-assets remains uncertain. If the linkage between the financial system and crypto-asset markets strengthens, there is growing concern that the destabilizing factors of crypto-asset markets could negatively affect the stability of the financial system through various channels.

A comprehensive review of the channels through which the risk of crypto-asset markets is transmitted to the domestic financial system showed that the high volatility of crypto-asset prices does not currently have a significant impact. However, it should be noted that, amid the buildup of financial imbalances, if excessive speculative demand for crypto-assets in the absence of precise assessments of their economic value leads to the expansion of trading volume and strengthening of the linkage between the real economy and financial sector, crypto-asset markets could pose a potential risk to the financial system.

In particular, as new funds that recently flowed into domestic cryptocurrency exchanges came largely from younger investors,[15] investment losses from high volatility are likely to be concentrated among such young people.

In response to all of this, the Bank of Korea will closely monitor developments related to crypto-assets, such as the trends of household loans and changes in the balance of bank accounts related to crypto-asset transactions, and cooperate with policy authorities to safeguard financial stability.

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15) During the first quarter of 2021, 67% of new investors at domestic cryptocurrency exchanges were found to be those in their 20s to 30s. This may be due to the fact that the expected return from investment in crypto-assets is larger than existing assets such as stocks and commodities, or that crypto-asset investment is an alternative to real estate investment as it does not require a large amount of funds, unlike real estate investment.

Analysis of Financial Stability Issues

# Ⅰ. Financial Vulnerability Index: New Compilation Results and Implications

1. Background

In the aftermath of the global financial crisis, new indices were developed in the US and other major countries for use in the monitoring of financial stability conditions to identify early warning signs of instability and better prepare for future crises.

Initially, financial stability-related indices were mainly focused on detecting signs of financial instability at an early stage and any resulting contraction in the real economy based on market price variables.[1] More recently, however, a new type of index, aimed at assessing potential vulnerabilities[2] in the financial system, has been introduced. These indices known as financial vulnerability indices,[3] measuring medium- and long-term risks to financial stability, are currently being developed and compiled by major central banks and international organizations. Concretely, the new focus is on assessing the overall vulnerability of the financial system by taking into account both financial imbalances caused by asset bubbles or excess credit accumulation and financial institutions' resilience[4] to adverse domestic or external shocks (Figure Ⅰ-1).[5]

Figure Ⅰ-1. Structure of financial stability-related indices
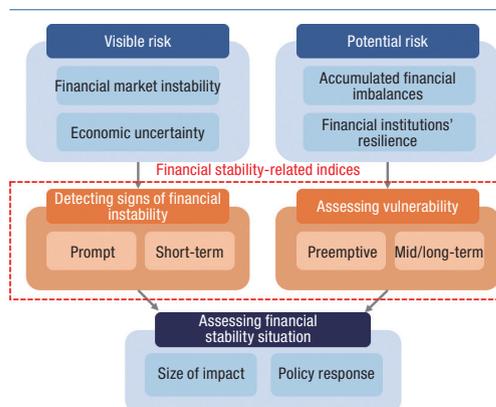
Note: 1) Written with reference to financial stability monitoring systems of the IMF, FRB and ECB

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1) Examples include financial stress indices designed to rapidly identify signs of financial instability based on price variables in the financial markets, such as the St. Louis Fed Financial Stress Index (STLFSI) or the ECB Composite Indicator of Systemic Stress in the Financial System (CISS), and financial conditions indices assessing the impact of financial conditions on the real economy, such as the Chicago Fed's National Financial Conditions Index (NFCI). The Financial Stability Index (FSI), developed in 2011 by the Bank of Korea, is also a similar example.

2) Financial vulnerability is an attribute of the financial system, characterized by accumulated financial imbalances that make it susceptible to systemic disruptions in the event of an adverse domestic or external shock.

3) Examples include the U.S. Aggregate Index of Vulnerability (FRB) and the Cyclical Systemic Risk Indicator (ECB).

4) Resilience refers to the ability of a financial system to withstand and absorb shocks and thereby prevent the amplification of risks arising from accumulated financial imbalances.

5) The Financial Stability Report of the Bank of Korea also devotes a section to the assessment of financial imbalances in credit and asset markets and the vulnerabilities of financial institutions (titled "Financial Stability Situation") and another to the assessment of the resilience of financial institutions ("Resilience").

The Bank of Korea has been compiling the Financial Stability Index (FSI)[6] since 2011 to more effectively measure and assess the probability of financial instability and systemic risks. The BOK Financial Stability Index is designed to detect earlier

signs of financial instability based on market price variables and changes in the sentiment of economic agents. Its key advantage is the ability to capture short-term changes in economic and financial conditions. On the other hand, this index is not as effective in identifying long-term financial instability factors and has also the limitation that it does not take into consideration resilience, which is an indicator of the extent to which the financial system is able to withstand the shock of an adverse event.

More recently, in line with international trends, the Bank of Korea developed[7] a Financial Vulnerability Index (FVI), providing a medium and long-term picture of the financial stability situation based on the assessment of imbalances and the level of resilience of the financial system. The addition of the FVI has allowed the Bank of Korea to more comprehensively assess financial stability conditions in Korea.

2. Construction and methodology

A. Definition of FVI

Financial stability[8] refers to a condition in which the financial system is capable of absorbing domestic or external shocks and sudden adjustments of imbalances, and in which core financial services (intermediation of money, payments and settlements, etc.) can be provided smoothly and consistently. Accordingly, in order to accurately assess the financial stability situation, it is important to evaluate not only accumulated imbalances and other potentially disruptive factors within the financial system, but also the capacity of financial institutions to withstand shocks.

The main purpose of the Bank of Korea's newly-developed FVI is to assess potential risks in the medium- and long-term horizon by measuring the financial system's vulnerability to shocks. The new index considers both financial imbalances and the resilience of financial institutions. A rise (drop) in the FVI means increased (reduced) financial imbalances and a weakening (strengthening) in financial institutions' resilience, indicating an increase (reduction) in the structural vulnerability of the financial system, which increases (decreases) the magnitude of the negative impact of a domestic or external shock on the economic and financial system.

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6) For further details on the Financial Stability Index, refer to the April 2012 Financial Stability Report, <Box IV-1> 「Outline of Financial Stability Index (FSI)」(page 148).

7) On September 24, 2020, FVI (then known as "FSI-Q") values from a pilot compilation were disclosed in a press release (「Financial Stability Situation (September 2020」) about a regular meeting of the Bank of Korea's Monetary Policy Board ("financial stability meeting"). The FVI values in this report are final, official values, which were tested for stability, and diverge slightly from the values that were initially disclosed last year.

8) The above definition is borrowed and paraphrased from the ECB ("Progress towards a Framework for Financial Stability Assessment," 2007) and the Bank of Korea ("Macroprudential Policy in Korea," 2015).

B. Structure and sub-indicators

For the structural design of the FVI and the selection of its sub-indicators, the financial stability assessment systems of central banks in major countries and international organizations were consulted, along with studies on economic and financial conditions in periods leading up to and immediately following past financial crises.

A strengthening in economic agents' risk appetite leads to an underestimation of risk in assets and financial markets and thus can lead to a surge in the prices of assets such as real estate, stocks and bonds. Asset inflation can cause financial imbalances to sharply worsen, especially if accompanied by an increase in the volume of new debt contracted by households and companies, amplifying potential risks to the financial system to a level that is no longer sustainable for the real economy. Meanwhile, in the case of countries like Korea with a high volume of external trade and capital transactions, excessive external borrowings can also contribute to the worsening of financial imbalances.

In such situations where asset overvaluation and a concomitant accumulation of credit result in an excessive buildup of financial imbalances, there is a risk that an adverse domestic or external shock might trigger sudden deleveraging and a sharp drop in asset prices, causing the real economy to contract.[9] However-

er, the negative impact of a domestic or external shock will be mitigated if the resilience of financial institutions is kept stable, with both the capital and leverage of banks and NBFIs remaining at a healthy level (Figure Ⅰ-2).

Figure Ⅰ-2. Relationship between major component items of FVI and financial stability situation
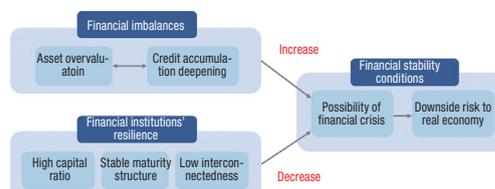
Designed to take into account both financial imbalances and the resilience of financial institutions, the FVI consists of three component items: asset prices, credit accumulation and the resilience of financial institutions. The goal is to reflect a comprehensive range of factors, including valuation in assets markets, debt size in credit markets and the financial positions and business relationships of financial institutions. Under these three components are 11 sectors, including real estate, stocks and bonds (under assets prices), household, corporate and external sectors (under credit accumulation) and banks, securities companies, credit card companies, insurance companies and interconnectedness (under the resilience of financial institutions).[10] The 11 sectors, in turn, have under them appropriate sub-indicators,[11] 39 in total (Figure Ⅰ-3).

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9) The historical experience of 14 developed countries during the period 1870-2008 demonstrates that the higher the level of credit accumulation prior to a financial crisis, the greater the contraction of the real economy after the financial crisis, in the form of decline in economic growth or decrease in investment (Jorda et al., "When Credit Bites Back," 2013).

10) Although interconnectedness can have beneficial effects when a shock to the economy is moderated by distributing risks across multiple financial institutions through risk sharing, when losses from a shock rise beyond a financial institution's absorption capacity, it becomes a vulnerability as it can transmit risks across interconnected institutions and amplify them (Acemoglu et al., "Systemic Risk and Stability in Financial Networks," 2015).

Figure Ⅰ-3. Structure of FVI
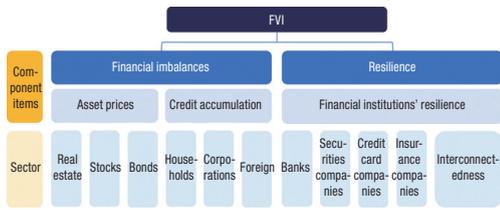
Unlike the FSI, which is compiled monthly, the FVI will be compiled on a quarterly basis as most data related to the structural vulnerability of the financial system such as accumulated financial imbalances are quarterly data.[12]

C. Index calculation methodology

The calculation of the FVI involves four distinct stages: ① normalization of sub-indicators, ② extraction of the common factor for each of the sectors, ③ calculation of an aggregate index through equal-variance weighted averaging, and ④ conversion of the index value to a 0-100 scale (Table Ⅰ-1).

Table Ⅰ-1. FVI calculation methodology

Calculation stage	Details
Step 1	Normalization[1] of sub-indicators	$z_t^i = \dfrac{x_t^i - \overline{x^i}}{std(x^i)}$
Step 2	Extraction[2] of common factor f_t^i for each sector	$z_t^i = \lambda_t^f f_t^i + u_t$ $\lambda_t^f = \lambda_{t-1}^f + \nu_t$ $f_t^i = c_t + B_t f_{t-1}^i + \epsilon_t$
Step 3	Calculation of aggregate index through inverse-variance weighting	$I_t = \sum_{i=1}^{11}(w_i \times f_t^i)$ (w_i : weight for sector)
Step 4	Conversion of index value to 0-100 scale by Min-Max method	$FVI_t = \dfrac{I_t - \min(I_t)}{\max(I_t) - \min(I_t)} \times 100$

Notes: 1) Sub-indicators with trends such as credit and asset prices are standardized after removing long-term trends by subtracting the 3-year moving average of the GDP growth rate from the 3-year moving average of the growth rate.
2) Extracting common factors of the sub-indicators using a time-varying parameter dynamic factor model.

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11) The structure and sub-indicators of the FVI are as follows:

Component	Sector	Sub-indicators
Financial imbalances — Asset prices (8 indicators)	Real estate	Price-to-income ratio,[1] housing sales price growth,[1] rental price growth on mid- to large-size commercial buildings[1]
	Stocks	Price-to-earnings ratio, price-to-book ratio, V-KOSPI[2)3)]
	Bonds	Credit spreads,[2)3)] commercial paper spreads[2)3)]
Financial imbalances — Credit accumulation (14 indicators)	Households	Change in household credit,[1] change in home mortgage loans,[1] loan demand (household loans, housing loans), household debt service ratio (DSR), households' financial assets-to-financial debt ratio
	Corporations	Change in corporate credit,[1] loan demand (large enterprises, SMEs), corporate DSR, debt ratio
	External sector	Change in external debt,[1] short-term external debt/total external debt, official foreign reserves/short-term external debt[3]
Financial institutions' resilience (17 indicators)	Banks	Leverage (commercial banks), short-term debt ratio, loan-to-deposit ratio, common equity tier 1 capital ratio,[3] liquidity coverage ratio[3]
	Securities companies	Leverage, short-term debt ratio, NCR (net capital ratio)[3]
	Credit card companies	Leverage, short-term debt ratio, adjusted capital ratio[3]
	Insurance companies	Life insurance companies' risk-based capital (RBC),[3] general insurance companies' RBC[3]
	Interconnectedness	Value of transactions between financial institutions,[1] change in the overall financial sector's total liabilities[1] DebtRank (between financial sectors), HHI (Herfindahl-Hirschman Index, between financial sectors)

Notes: 1) Trend-adjusted values were used for these indicators as they are a diverging type of variable.
2) Log-converted values were used for these variables, whose volatility can increase excessively during certain periods.
3) These sub-indicators were converted to a negative value, as they move in the opposite direction from the FVI.

12) The aggregate vulnerability index (FRB, U.S. Aggregate Index of Vulnerability) and the cyclical systemic risk index (ECB, Cyclical Systemic Risk Indicator), compiled by the US Federal Reserve, Bank of England and the European Central Bank (ECB), are also quarterly indices. Meanwhile, as financial vulnerability is a phenomenon with a low level of volatility, brought about through a gradual accumulation of vulnerability factors over the medium and long term, the quarterly compilation of a vulnerability index should not interfere with its utility in assessing medium and long-term risks.

First, the values of the 39 sub-indicators were normalized so as to take into account that each sub-indicator has different variations. Next, common factors (11) of the sub-indicators were extracted using a time-varying parameter dynamic factor model.[13] The aggregate index was calculated through the weighted averaging of the common factors of each of the 11 sectors. Equal-variance weighted averaging[14] was used for this calculation to control the influence of the common factors with different variance on the overall variance of the index. Lastly, the final index was converted to a value between 0 and 100, 100 being the historically highest value. The closer the FVI is to 100, the closer it is to the peak value reached during the period with the highest degree of financial vulnerability. The same steps can be used to calculate component-specific indices for the three component items or sector-specific indices for the 11 sectors.

D. Results of calculation

The results of calculation showed that the FVI explains the levels of financial vulnerability in Korea in periods leading up to and immediately following past crises with relative accuracy. When the degree of financial vulnerability was visualized by sector using a heatmap,[15] factors contributing to the accumulation of vulnerability in each sector also seem to be well identified.

The movement of the FVI, which rapidly rose during the periods leading up to the outbreak of the 1997 foreign currency crisis, 2003 credit card crisis and the 2008 global financial crisis, clearly reveals its leading nature. In other words, it demonstrates that in situations where the vulnerability of the financial system was elevated due to a high level of financial imbalances, a sudden domestic or external shock led to a systemic crisis. The heatmap, furthermore, allows the tracking of sectors which were the main destabilizing factors in each of the past crises. The stock market and the corporate and external sectors were the main triggering factors for the foreign currency crisis, the household, banking and card sectors for the credit card crisis, and the real estate and stock markets and the external sector for the global financial crisis (Figure I -4).[16] Consistent with related practices by the

13) To take the example of the stock markets, the common factor of the three individual indicators, namely, PER, PBR and V-KOSPI, is the common movement in these variables, which becomes discernable when temporary and irregular influences are minimized. Here, the influence of each of the sub-indicators on the common factor was designed as a time-varying parameter, which reflects changing economic conditions (Koop and Korobilis, "A New Index of Financial Conditions," 2014).

14) A weighted averaging method in which the weight of an individual item is the sum of the reciprocals of the standard deviations of all items divided by the reciprocal of the standard deviation of this item (weight of individual item i is $\omega_i = \sigma_i^{-1}/\Sigma_i \sigma_j^{-1}$).

15) The FVI and the sector indices were placed in order from highest to lowest. The map was then divided into 20 cells and different colors were used for each cell for the visualization of values. Heatmapping is a method widely used by central banks, including the US Federal Reserve and the Bank of England, in the monitoring of financial stability (Aikman et al., "Mapping heat in the U.S. financial system," 2017, etc.).

16) Meanwhile, after the outbreak of a crisis, the FVI tended to rapidly decline as the asset bubble burst and deleveraging kicked in. Concretely, during the foreign currency crisis, reduced credit supply in the corporate and external sectors was the key contributing factors to the drop in the FVI, while such factors were the slowdown in household credit and the improvement in the resilience of credit card companies in the case of the credit card crisis and the bursting of the asset bubble and the slowdown in credit growth in the case of the global financial crisis.

17) The assessment of financial stability by the IMF (Financial Vulnerability Indices) and the ECB (Cyclical Systemic Risk Indicator) is based on the comparison of key indicators with their past values, with no set threshold established.

IMF and the ECB,[17)] no threshold was set for the level of vulnerability.[18)]

Figure Ⅰ-4. FVI trends and sector heatmap

Foreign currency crisis (November 1997) Global financial crisis (September 2008)

100.0

73.6

58.9

FVI

Asset prices
Real estate
Stocks
Bonds

Credit accumulation
Households
Corporations
External sector

Resilience
Banks
Securities companies
Credit card companies
Insurance companies
Interconnectedness

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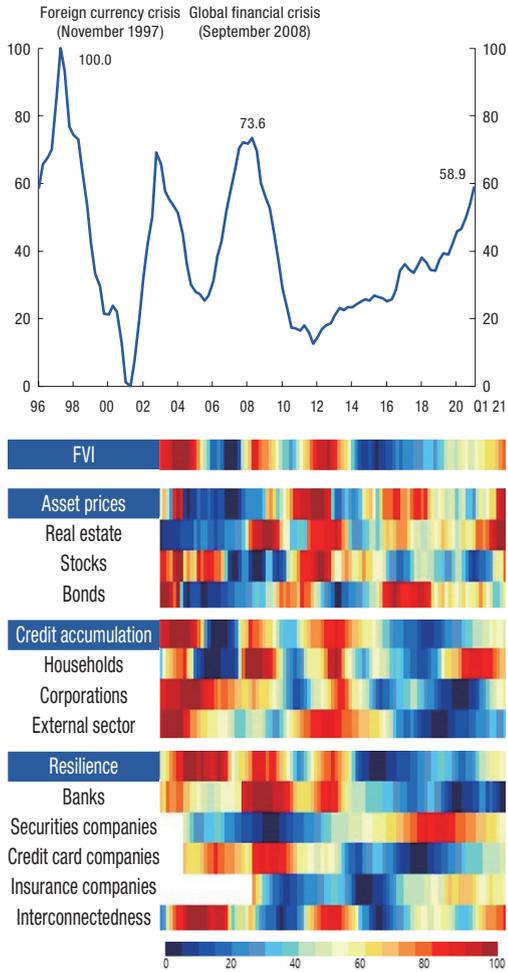
18) In the case of the FSI, in order to separate shocks by the size of their impact on the financial system, two threshold values were established "cautionary" and "crisis" thresholds drawing on the methodology of Borio and Drehmann (2009). A situation classified "cautionary" is typically one in which a domestic or external shock has a moderate impact, while a "crisis" situation is one in which the shock has a severe impact on the economic and financial system in Korea.

3. Assessment of recent financial stability situation

According to the results of the FSI, the financial system briefly ventured into crisis territory in April 2020, but the index continuously has decreased thereafter to fall below the cautionary level, suggesting that the level of instability was improved subsequently by a significant degree (Figure Ⅰ-5). Last year, in the immediate aftermath of the COVID-19 pandemic, the Korean financial system underwent a period of instability, marked by heightened volatility in the financial markets and deteriorated economic sentiment of households and companies, but appears to have quickly returned to stability thanks to an active policy response from the government and the Bank of Korea.

Figure Ⅰ-5. Recent trends[1] in FSI

Note: 1) Preliminary figures for April and May 2021.

However, the results of the newly-developed FVI are sharply at odds with this assessment. According to the FVI, the potential vulnerability of the Korean financial system has been rapidly increasing. The FVI for the first quarter of 2021 stood at 58.9, representing a sizeable increase from before the COVID-19 pandemic (41.9 during the fourth quarter of 2019). Even though the FVI was already edging higher prior to the pandemic, lifted by the risk appetite of economic agents and credit accumulation, the steep rise in the prices of assets in the real estate and stock markets after the onset of the pandemic has accelerated the pace of its increase. However, thanks to the continuing improvement in external soundness and the resilience of banks, the FVI has remained well below the highs reached during past crises (100.0 during the second quarter of 1997, 73.6 during the second quarter of 2008) (Figure Ⅰ-6).

Figure Ⅰ-6. Recent trends in FVI
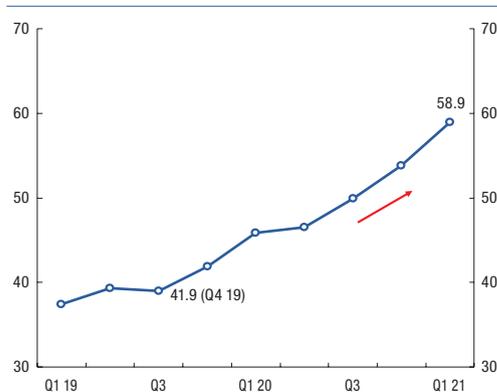
By component item, the total asset price index has been rapidly rising as the profit-seeking tendency has strengthened in the stock and real estate markets amid a decrease in credit reticence in the bond markets to pre-pandemic levels.[19] The total asset price index (91.7 during the first quarter of 2021) is currently approaching the record highs reached during

19) Real estate is the only one of the 11 sectors tracked by the total asset price index that scored 100, which means that it is currently (first quarter of 2021) at the highest point in the entire period covered by the FVI.

the foreign currency crisis (93.1 during the second quarter of 1997) and the global financial crisis (100.0 during the third quarter of 2007). This trend appears to be correlated with worldwide asset overvaluation amid an improvement in the global economy, raising concerns about a major price adjustment going forward.[20] (Figure Ⅰ-7).

Figure Ⅰ-7. Asset price assessment items

The total credit accumulation index, despite inching slightly higher since the onset of the COVID-19 pandemic, is still well below the levels recorded during past crises.[21] This result, in spite of a massive increase in household and corporate credit, is mainly explained by the recent improvement in the soundness of the corporate and external sectors.[22] Nevertheless, the credit accumulation index for the

household sector stands at an elevated level of 68.4, making it highly vulnerable to changes in economic and financial conditions in the form of an asset price adjustment or a rise in market interest rates (Figure Ⅰ-8).

Figure Ⅰ-8. Credit accumulation assessment items
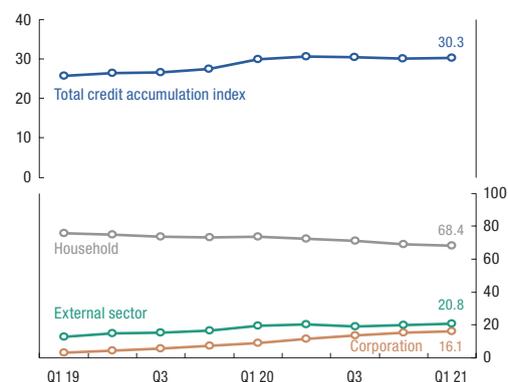
The resilience of financial institutions, although on a slow downward trend, remains at an adequate level. Banks' resilience has been especially robust under the influence of the more stringent regulatory requirements in place since the global financial crisis. Meanwhile, the earlier-than-planned implementation of the Basel III reforms during 2020 has resulted in further improvement in banks' resilience indicators.[23] However, the increased level of interconnectedness between financial

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20) In its May 2021 Financial Stability Report, the US Federal Reserve noted that amid a generalized increase in the prices of risky assets, the prices of some assets were currently overvalued compared to their expected future cash flows, and warned about the possibility that a negative turn in risk appetite could cause a sudden drop in asset prices.

21) The total credit accumulation index for the first quarter of 2021 stood at 30.3, which is well below the highs during the foreign currency crisis (100.0 during Q4 1997) and the global financial crisis (73.5 during Q4 2008).

22) At the end of 2020, the debt ratio of corporations stood at 77.2% (based on 2,520 companies subject to external audit requirements), substantially below the corresponding figure during the global financial crisis (111.7% at the end of 2008). Meanwhile, both the short-term debt ratio (46.6% at the end of 2008 → 29.2% at the end of 2020) and the ratio of short-term debt to official foreign reserves (138.1% at the end of 2008 → 278.1% at the end of 2020), two indicators of external soundness, have improved significantly.

institutions amid the effort to facilitate credit provision in response to the COVID-19 pandemic, resulting in accelerated growth in the assets of both banks and NBFIs, calls for attention (Figure Ⅰ-9).

Note: 1) Q1 2021 basis.

Figure Ⅰ-9. Financial institutions' resilience assessment[1] items
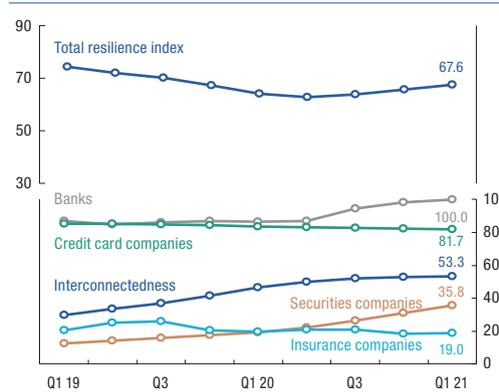
Notes: 1) An increase in the total resilience index and indices by financial sector means improvement in the resilience of the financial system (decrease in FVI). However, the increase in the interconnectedness index is the cause of the increase in FVI.

As for the financial imbalance-related indices at the current point in time, the asset price sub-index was the highest in the real estate sector, while the credit accumulation sub-index was the highest in the household sector (Figure Ⅰ-10).

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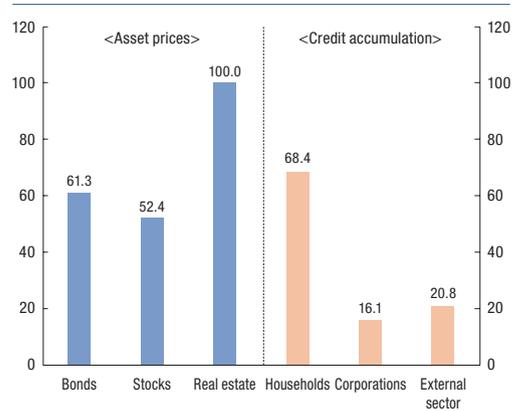
23) Last year, to prevent the increase in financial relief measures from causing a sharp drop in banks' capital ratios, the government decided to adopt the revised Basel III credit risk rules in June 2020, seven months earlier than the initially planned date of January 2022, as the changes include the downward adjustment of risk weights applied to corporate loans. As a result, commercial banks that are now under the revised credit risk framework saw an improvement in their capital adequacy ratio.

4. Implications and Future Plans

To sum up the above-discussed assessment results, although short-term financial instability factors since the onset of the COVID-19 pandemic have been resolved for the most part, risks to financial stability in the medium- and long-term horizon appear to have increased. The broader implication is that, even though the level of financial vulnerability currently appears lower than the levels during past crises thanks to external soundness and stronger resilience among financial institutions, increased vigilance is in order against any future surge in asset prices and credit accumulation.

The Bank of Korea followed up on its Financial Stability Index (FSI), developed in the aftermath of the global financial crisis to strengthen the monitoring of the financial system, with the new Financial Vulnerability Index (FVI), which takes into account both financial imbalances and resilience. The development of the FVI is significant insofar as it not only allows the identification of early signs of financial instability, but also a timely assessment of risks to financial stability in the medium- and long-term time horizon so that efforts can be made from varied angles to ensure and foster stability in the financial system.[24]

As a tool that can evaluate overall financial stability situation as well as rapidly identify changes in individual sectors in consideration of a comprehensive range of factors, the FVI is expected to serve as a key reference indicator in the assessment of macroprudential conditions and policy-making. The FVI will be also used in the analysis of the impact of financial vulnerability on the real economy and other financial stability issues.[25]

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24) Using the FVI in parallel with the FSI, the Bank of Korea plans to create a balanced framework for monitoring the financial stability situation, which both looks for ongoing signs of instability and tracks the level of accumulated vulnerabilities.

25) Recently, there has been an increased level of research, both by the IMF and the Bank of Korea, on the impact of financial vulnerability on downside risks to GDP growth. For a further discussion on this issue, refer to the June 2019 Financial Stability Report, <Box 1> 「Assessments of Financial Vulnerability of Korea using Growth-at-Risk Approach」(page 15) and the September 2020 Financial Stability press release, <Box 2> 「Assessment of the Vulnerability of the Post-COVID-19 Financial System and Evaluation of Downside Risks to the Real Economy」(page 20).

II. The Impact of Accumulated Financial Imbalances on the Financial System

1. Background

After having been brought to a standstill last year by the COVID-19 pandemic, the world economy has in recent months been progressively shaking off the fallout, helped by economic stimulus policies in the US and other major countries and improved investor sentiment. Although uncertainty still lingers as to how the pandemic will unfold going forward, the recovery in the world economy is expected to gradually gain pace, particularly in developed countries and China. Korea's domestic economy is also expected to grow at a rate faster than previously thought.[1] While the world economy moves into its recovery phase, there is also a rising concern about deepening financial imbalances such as rapid debt growth and high asset valuations in real estate and stocks markets, brought on by the dovish policy stance since the COVID-19 crisis.

In the event of an adverse shock, an excessive buildup of financial imbalances can increase downside risks to the real economy, further destabilizing the financial system.[2] As an economy with a high degree of external reliance, Korea has first-hand experience of how a sudden contraction in global liquidity and other external shocks can lead to a real economic and financial crisis. Whilst there are various domestic and external risk factors such as the recent overheating in asset markets, downside risks to the real economy may be far greater under severe financial imbalances despite the size of a shock being equal.

This article examines the relationship between financial imbalances and real economic downside risks and analyzes how in a situation where there is an accumulation of financial imbalances, built up over a significant period of time, the financial system can be impacted by the materialization of downside risks from an unexpected shock.

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1) The IMF predicted that the world economy and the Korean economy will grow by 6.0% and 3.6%, respectively, in 2021 (IMF World Economic Outlook, April 2021). In May this year, the Bank of Korea made an upward revision to its February growth forecast for the Korean economy (3.0%) by raising it by 1.0%p to 4.0% to reflect the recent recovery trend in the global economy.

2) In past financial crises, a high valuation of assets and a large buildup of financial imbalances in both financial and non-financial sectors were common in developed countries as well as emerging market countries during the period leading up to the crisis (Lee et al., "The Anatomy of Financial Vulnerabilities and Banking Crises," 2020). When an excessive buildup of financial imbalances makes the financial system vulnerable to shocks, even a small shock can trigger a full-blown crisis.

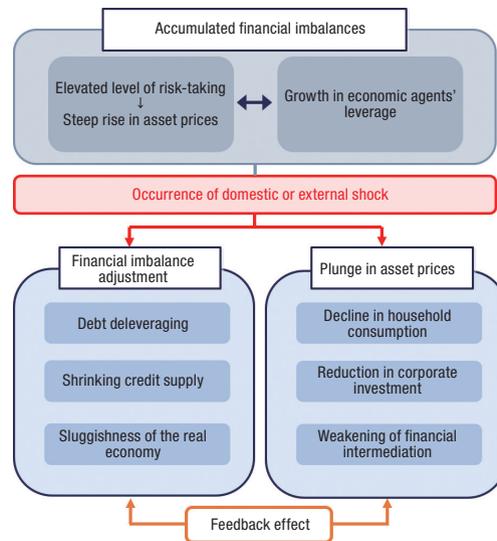# 2. Financial imbalances and downside risks to the real economy

A. Relationship between financial imbalances and real economy

Financial imbalances refer to a situation in which an elevated level of risk-taking leads to a steep rise in asset prices and excessive increase in leverage. While an appropriate level of debt can have a positive effect on the economy as it contributes to greater efficiency in the distribution of resources across time, excessive growth in leverage, accompanied by surging asset prices, can produce the opposite effect by reducing the efficiency of resource distribution and increasing the debt service burden of economic agents.

As for the path of propagation of the negative impact of accumulated financial imbalances to the real economy, it begins with economic agents underestimating the risk carried by risky assets in a situation where there is a significant buildup of imbalances, creating conditions conducive to asset bubbles. If, in such an environment, a sudden and unexpected domestic or external shock occurs, this can result in an abrupt shift in risk attitude toward risk avoidance, triggering a rapid drop in asset prices and deleveraging. Falling asset prices and debt deleveraging set off a vicious circle as they lead to a decline in household consumption and corporate investment, which, in

turn, cause a decline in the real economy. The debt servicing capacity of both households and companies is weakened in the process. As a result, financial institutions face a higher level of credit risk, which weakens their financial intermediation role and ultimately leads to slowed growth(Figure Ⅱ-1).

Figure Ⅱ-1. Relationship between financial imbalances and real economy

B. Analysis of Downside Risks

To assess the downside risks that current imbalances in the financial system present to the real economy, growth-at-risk (GaR)[3] analysis was performed using the Financial Vulnerability Index[3] (hereafter the "FVI"). GaR analysis[4] is a method that focuses on the negative impact of financial imbalances on GDP growth, and is widely used by central

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3) The Financial Vulnerability Index (FVI) is an index assessing medium- and long-term financial stability conditions based on financial imbalance-related indicators such as asset prices and credit accumulation as well as indicators of financial institutions' resilience. The FVI tends to rise (fall) when financial imbalances increase (decrease). For details, refer to <Analysis of Financial Stability Issues> 「Ⅰ. Financial Vulnerability Index (FVI): New Compilation Results and Implications」(page 131).

banks of major countries, including the US and the UK, to measure downside risks to the real economy. The results of analysis indicate that downside risks to the Korean economy, as measured by taking into account the level of financial imbalances, have increased since the COVID-19 crisis and that there is a rising level of uncertainty surrounding the path of growth.

The lower 10th percentile GaR (the same hereafter) for the period after the fourth quarter, forecasted at different points in time, showed an overall decline since the COVID-19 crisis, suggesting that downside risks to the real economy, considering the level of financial imbalances, are increasing. The GaR after the fourth quarter, forecasted in the first quarter of 2021, stood at -0.75% (annualized rate). Although this is higher than the GaR forecast from the second quarter of 2020, which reflected the sharp slowdown in growth in the immediate aftermath of the COVID-19 outbreak, it nevertheless points to a gradual increase in the overall downside risk to the real economy as financial imbalances continue to build up (Figure Ⅱ-2).

Figure Ⅱ-2. GaR[1] and FVI
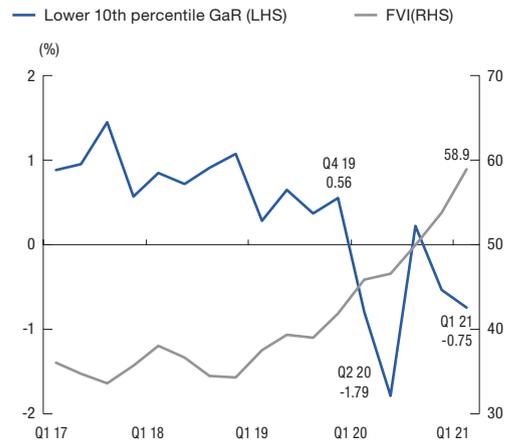
Note: 1) Real GDP growth rate (annualized) after four quarters predicted at each point in time, reflecting FVI at that time, indicating the lowest growth rate that can appear with 10% probability over the next year.

Meanwhile, the distribution of projected future GDP growth, forecasted by taking into account financial imbalances,[5] indicates that the tail risk to growth is increasing (Figure Ⅱ-3). Moreover, the examination of the distribution of projected future GDP growth by time point reveals that the width of distribution, which is a measure of uncertainty surrounding the path of growth, is also progressively increasing[6] (Figure Ⅱ-4). However, it must be

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4) Growth-at-risk (maximum expected rate of GDP decline) analysis is a method of expressing financial vulnerability in terms of GDP losses expected from a domestic or external shock. The method was proposed by the IMF based on the results of its research on interactions between financial markets and the real economy (Adrian et al., "The Term Structure of Growth-at-Risk," IMF WP, 2018). In September last year, to assess downside risks to the real economy resulting from a buildup of financial imbalances, the Bank of Korea conducted a GaR analysis by making minor modifications to the IMF methodology, with the Financial Vulnerability Index (then known as the "FSI-Q") used as the explanatory variable. For the GaR analysis in this article, a quantile regression similar to the one used for last year's analysis was chosen. For further details, refer to the press release on financial stability conditions (September 2020), <Box 2>.

$$\tilde{y}_{t+h}^{q} = \alpha_h^q + \beta_{y,h}^q y_t + \beta_{F,h}^q FVI_t + \epsilon_t + h$$

Here, $\tilde{y}$: moving average of the rate of real GDP growth from the previous quarter for period h, y: rate of real GDP growth from the previous quarter, FVI: Financial Vulnerability Index, q: quantile, h: forecast horizon.

5) It is not appropriate to directly compare the GaR distribution and the optimistic/pessimistic forecasts of regular economic outlook updates by the Bank of Korea, as the two are distinct estimates having different methodologies and goals. The goal of mapping the distribution of projected future GDP growth based on GaR analysis is to express financial vulnerability in terms of GDP losses, which must not be confused with general economic growth forecasts.

6) Even though downside risks to growth are increasing, the median, corresponding to the 50th percentile, has been mostly range-bound (3.85% in Q4 2018 → 4.16% in Q4 2019 → 3.98% in Q4 2020 → 4.32% in Q1 2021).

noted that this trend assumes a situation in which the FVI continues to rise. If the economy grows faster than expected this year, the decline in GaR could be more modest.

Figure Ⅱ-3. Expected distribution[1] of future GDP growth rates[2]
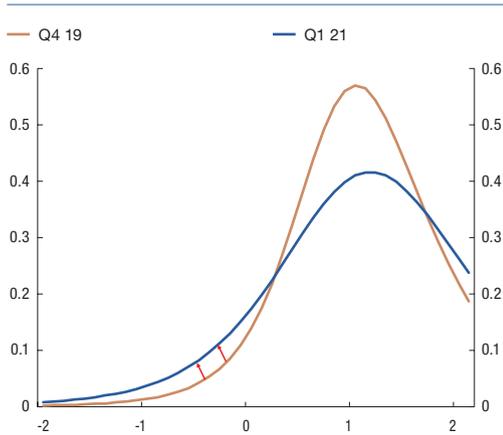
Notes: 1) Real GDP growth rate (annualized) after four quarters predicted at each point in time.
2) Horizontal axis is the real GDP growth rate (annualized) and vertical axis is the probability density function value.

Figure Ⅱ-4. Changes in the expected distribution[1] of future GDP growth rates

Note: 1) X-axis is the real GDP growth rate (annualized), Y-axis is time, and Z-axis is the probability density function value.

3. Impact of financial imbalances on the financial system

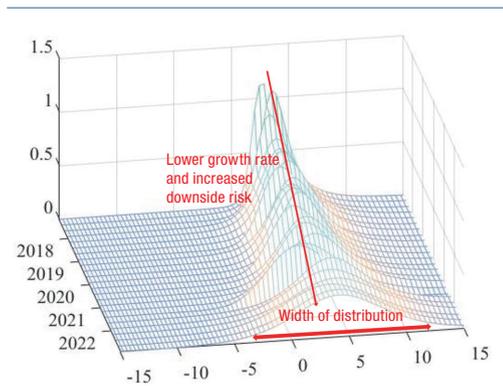This section estimates the extent of expected downside risks to the real economy[7], assuming that financial imbalances continue to build up for the foreseeable future, and analyzes[8] the impact of downside risks to growth on financial institutions' resilience and the financial system in the event that a sudden, adverse domestic or external shock causes them to materialize. A stress test was performed under the scenario in which financial imbalances continue to accumulate for a substantial period of time (next three years) and a domestic or external shock pushes down growth to the lower 10th percentile GaR (Figure Ⅱ-5).

Figure Ⅱ-5. Impact of financial imbalances on financial system

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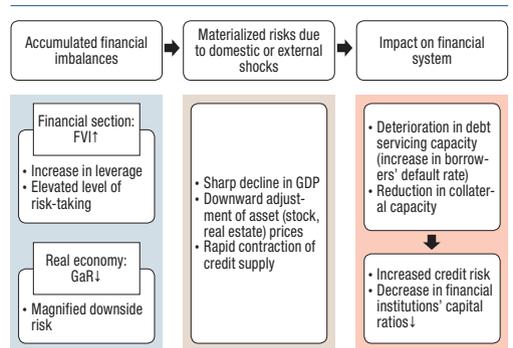
7) Given the Korean economy's high external reliance, the external sector is likely to be the sector in which downside risks to the real economy materialize, as was the case in past crises such as the foreign currency crisis and the global financial crisis. Particularly if central banks of major countries move to raise interest rates to respond to a faster-than-expected pace of recovery in the global economy, driven by recovery in the US and China, and inflation pressure, a slowdown in the pace of recovery cannot be ruled out, as this will lead to the contraction of global liquidity and heightened volatility in the international financial markets.

8) The IMF also warned recently about the possibility that increased risk-taking behavior, fostered by the prolonged low interest rate environment, could magnify downside risks to future growth by worsening financial vulnerability (IMF Global Financial Stability Report, April 2021).

A. Accumulation of financial imbalances and correction scenario

The scenario assumed in the stress test consists of two main stages. During the initial stage, financial imbalances continuously build up for the next three years. As a result of such accumulation of financial imbalances, downside risks to future economic growth, as measured by the FVI, increase massively from the level estimated based on the current size of financial imbalances. During the second stage, a domestic or external shock causes the magnified downside risk to economic growth to materialize, resulting in a sharp slowdown in growth.

(Buildup of financial imbalances and increased downside risks to growth)

Under the scenario of a sustained buildup of financial imbalances, GDP is assumed to continuously grow according to the forecast path by major domestic and international organizations (Table Ⅱ-1).

Table Ⅱ-1. Scenarios[1] for pre-shock GDP growth rate

(%)

2020	2021	2022	2023
-1.0	4.0	3.0	2.6

Note: 1) Values are forecast by BOK (as of May 2021) for 2021-22 and by IMF WEO (as of April 2021) for 2023.

In such situation, if. the prices of assets such as stocks and real estate rapidly rise[9], accompanied by higher leverage, the FVI level will commensurately escalate as well.[10] Concretely, the FVI is expected to rise from 58.9 in the first quarter of 2021 to 68.1 in the fourth quarter of 2023. Moreover, downside risks to the real economy (lower 10th percentile GaR), estimated using the FVI, are also expected to rise sharply (-2.2%) from the first quarter of 2021 (-0.8%), with uncertainty on the path of growth further intensifying as the width of the distribution of growth rates increases (Figure Ⅱ-6).

Figure Ⅱ-6. Probability distribution[2] of future GDP growth rate estimated using the FVI[1]

Notes: 1) Shaded areas indicate forecast values.
  2) Probability distributions are those of real GDP growth rates (annualized) after four quarters predicted at each point in time; horizontal axis indicates GDP growth rate (annualized) and vertical axis is the probability density function value.
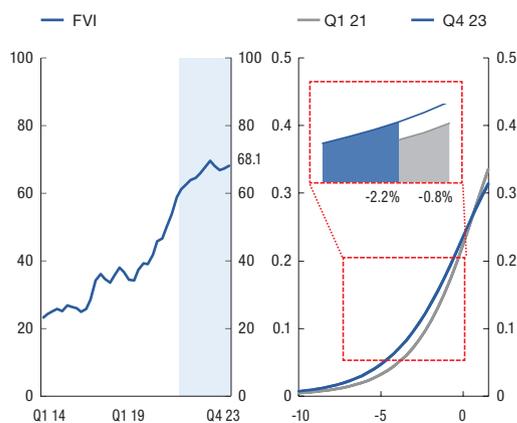
9) The assumption was made that amid continued risk-taking behavior, credit supply, real estate prices and stock prices, bolstered by robust growth, will rise at a rate similar to the average rate for 2020 or the period 2018-2020 for the next three years.

10) This is, however, somewhat lower than the FVI during the global financial crisis (73.6 during the second quarter of 2008). Although the rate of increase in the FVI is likely to be slower than last year, given that the COVID-19 crisis is being gradually brought under control and considering the current path of economic growth, it may also rise near the level reached during the global financial crisis depending on the size of accumulated financial imbalances i.e., the pace of credit growth and real estate prices as well as on the path of economic growth going forward.

(Materialization of downside risks from a domestic or external shock)

An assumption was made that an unexpected domestic or external shock causes the annual rate of growth to drop to -2.2%[11], corresponding to the lower 10th percentile GaR, over a period of four quarters from the time of the shock (first quarter of 2024). It was furthermore assumed that, as the rate of economic growth is below the forecast path, this has a negative effect on investor sentiment, resulting in increased risk avoidance. Finally, it was also assumed[12] that as a result of this, accumulated financial imbalances are rapidly corrected during 2024(Table Ⅱ-2, Table Ⅱ-3).

Table Ⅱ-2. Scenarios[2] for the GDP growth rate[1] before and after shock

(%)

	t+1	t+2	t+3	t+4
baseline	3.0	2.8	2.0	1.6
After shock	0.6	-2.1	-3.5	-4.0

Notes: 1) Year-on-year basis.
    2) Average annual growth rate is 2.4% for baseline scenario (forecast by IMF WEO, as of April 2021) and -2.2% for after-shock scenario.

Table Ⅱ-3. Scenarios[1] for major financial market indices

(%, bp)

	Q1 2021	Scenario	
		Average of test period	Maximum decrease[2]
Share prices	3,076	2,388	2,106
Change in housing prices[3]	5.0	-2.3	-3.5
Treasury bond (3-yr) spreads[4]	51	112	123
Corporate bond (3-yr) spreads[5]	50	193	211

Notes: 1) Quarterly average basis.
    2) Maximum increase for spreads.
    3) Based on housing sales prices; year-on-year basis.
    4) Treasury bond (3-yr) yield - call rate.
    5) Corporate bond (AA-, 3-yr) yield - Treasury bond (3-yr) yield.

B. Impact on the financial system

(Financial institutions)

Under the scenario in which a growth shock leads to a sharp correction of financial imbalances, the resilience of financial institutions appears to suffer a heavy toll. The results of analysis showed an extensive decline in capital ratios across all financial sectors, with a particularly marked decline seen among securities companies, insurance companies and banks. However, the results also showed that even after the shock, average capital ratios will still remain above regulatory minimum requirements in all sectors (Figure Ⅱ-7).

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11) Although the lower GaR quantile can be set to various different levels depending on the goal of analysis, the most common range is lower 5th-10th percentiles. In a recent issue of the financial stability report by the IMF (Global Financial Stability Report, April 2021), the GaR analysis was focused on the lower 10th percentile. In this analysis, if the lower quantile of growth were set to the 5th percentile, this would bring the size of downside risks to future growth to -3.5%.

12) The size of correction in credit growth and asset prices as a result of a GDP shock was estimated with the aid of the macro risk factor scenario generation module of SAMP (systemic risk assessment model of macroprudential policy), the Bank of Korea's stress test model, and based on the size of correction during the global financial crisis. The macro risk factor scenario module estimates the tail risk arising from imbalances in the financial sector based on Bayesian VAR.

Figure Ⅱ-7. Scenario test results[1]
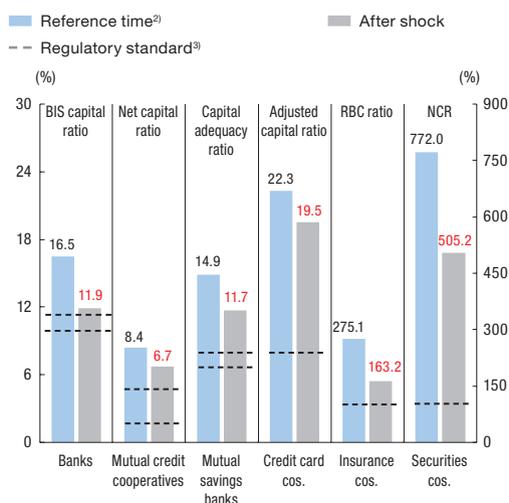
- Reference time[2]
- After shock
- Regulatory standard[3]

Notes: 1) Banks, mutual credit cooperatives, mutual saving banks, and credit card companies are on the left side; insurance companies and securities companies are on the right side.
2) Reference time is the end of Q4 2020.
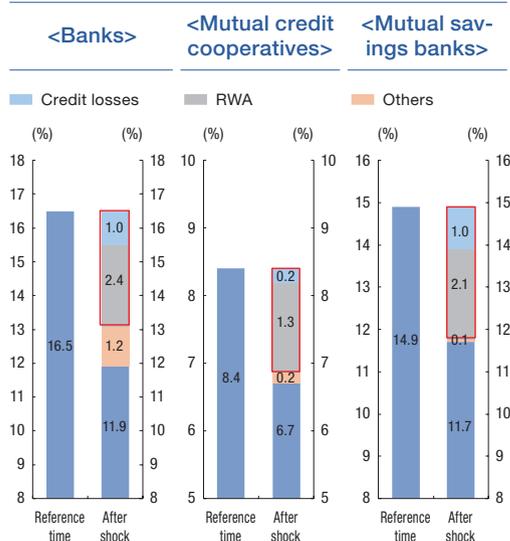3) Regulatory standards: 10.5% for banks (11.5% for D-SIBs), 2-5% for mutual credit cooperatives, 7% for mutual savings banks (8% for institutions with assets of more than 1 trillion won), 8% for credit card companies, and 100% for insurance companies and securities companies.

Figure Ⅱ-8. Changes in capital ratio due to credit losses and RWA changes[1][2]

- Credit losses
- RWA
- Others

Notes: 1) Reference time is the end of Q4 2020.
2) Market loss, original profits & losses, etc.

In the case of deposit-taking institutions such as banks, mutual credit cooperatives and mutual savings banks, the increase in risk-weighted assets (RWA) from rising defaults appeared to be a major contributing factor to the decline in their capital ratios, in addition to the increase in credit losses from non-performing loan assets (Figure Ⅱ-8).

By sector, the size of market losses resulting from a sudden adjustment of financial imbalances, such as falling stock prices and widened credit spreads, appeared to be the largest for insurance companies, followed by banks and securities companies, in this order, due to the important size of their marketable securities holdings. However, the contribution of market losses to the decline in the capital ratio was the largest for securities companies and the second largest for insurance companies,[13] as the share of total assets accounted for by marketable securities are greatest for these institutions[14] (Table Ⅱ-4).

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13) 59.4% for insurance companies and 57.5% for securities companies as of the fourth quarter of 2020.

14) The results of analysis showed that market losses could cause the net capital ratio (NCR) of securities companies and the risk-based capital (RBC) ratio of insurance companies to drop by 193.6%p and 106.8%p, respectively, from the baselines (772.0%, 275.1%).

Table Ⅱ-4. Estimated market losses[1] by financial institution sector

(trillion won, %)

Sector	Market losses (A)	Securities balance (B)	A / B × 100
Total	76.0	1,390.1	5.5
Banks	6.3	375.5	1.7
Mutual savings banks	0.0	2.7	1.7
Mutual credit cooperatives	0.1	11.6	0.7
Credit card cos.	0.5	4.5	11.9
Insurance cos.	63.6	637.1	10.0
Securities cos.	5.5	358.7	1.5

Note: 1) Cumulative during the period basis.

Meanwhile, the results also showed that some banks could see their capital ratios brought down by the shock under this scenario to a level below regulatory minimums and incur contagion losses of an estimated KRW 20.6 trillion. Losses incurred along the contagion path are estimated at KRW 16.6 trillion for banks, KRW 2.5 trillion for insurance companies and KRW 1.3 trillion for securities companies. Attention must be paid to the fact that, amid an intensifying level of interconnectedness between financial institutions, a shock triggering a sharp drop in capital ratios of a small number of institutions and forcing them to liquidate risky assets and reduce lending could lead to a broad decline in asset prices and additional valuation losses.[15]

(By sector)

The probability of default[16] on financial institutions' loan assets was estimated by dividing them into household loans and corporate loans. The results suggested that the shock could send the probability of default on household loans to 1.18%, up +0.35%p from 0.83% in the fourth quarter of 2020. By factor, the growth shock and the correction of financial imbalances contributed 0.17%p and 0.18%p, respectively, to the increase in default probability.

The results indicated that the rise in the probability of default could push up the size of non-performing household loans (KRW 1,424 trillion in total household loans as of the fourth quarter of 2020) to an estimated KRW 9.6 trillion.[17] This amount, representing 0.7% of total household loans by financial institutions, exceeds the baseline credit loss of KRW 5.4 trillion by KRW 4.2 trillion. The growth shock and the correction of financial imbalances are estimated to contribute KRW 2.2 trillion and KRW 2.0 trillion, respectively, to this increase in credit losses[18] (Figure Ⅱ-9).

15) Contagion losses are secondary losses incurred from asset or debt interconnectedness with other financial institutions, when these institutions' capital ratios are near or below regulatory minimum requirements. Contagion losses refer to all losses that may arise from default by an insolvent institution or the process through which this institution brings itself back into compliance with regulatory requirements. If the insolvent institution is declared bankrupt, some of the loan assets can no longer be collected and must be written off by the creditor. A rise in the number of insolvent financial institutions weakens trust between financial institutions and thus can lead to a credit crunch by drive up the cost of funding or making institutions call back existing loans or stop offering new credit.

16) The probability of default (PD) was estimated using logit regression. The explanatory variables used for this analysis were lagged dependent variables and macro variables such as the rate of economic growth, interest rates, currency exchange rates, stock prices and housing prices.

17) From the point of view of financial institutions, such change in asset soundness ratings is the same as credit losses. Loan balances are based on the amounts of household and corporate exposures of financial institutions covered under this stress test.

18) By type of financial institution, credit losses from non-performing household loans are larger among credit card companies and mutual savings banks, amounting to 3.2% and 2.2%, respectively, of their total household loan balance.

Figure Ⅱ-9. Factor analysis of household loans' probability of default[1] and credit losses[2]
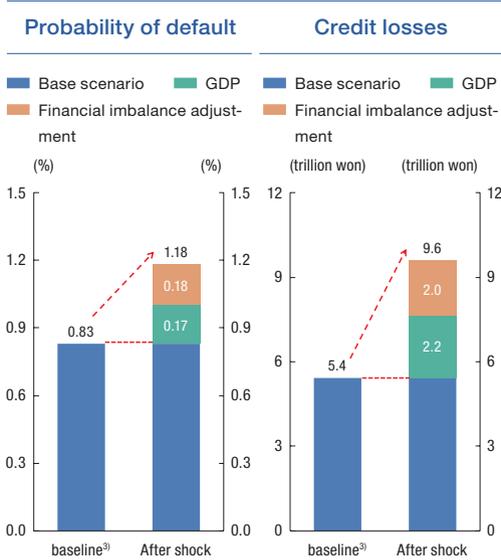
Notes: 1) Based on the probability of default of banks, mutual savings banks, and mutual credit cooperatives.
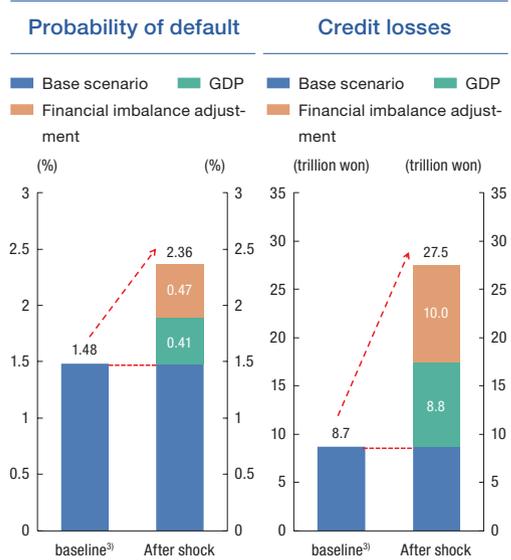2) Cumulative during the period basis.
3) The scenario where growth rates follows the baseline forecast.

Figure Ⅱ-10. Factor analysis of corporate loans' probability of default[1] and credit losses[2]

Notes: 1) Based on the probability of default of banks, mutual savings banks, and mutual credit cooperatives
2) Cumulative during the period basis.
3) The scenario where growth rates follows the baseline forecast.

The probability of default on corporate loans is estimated to increase after the shock by 0.88%p to 2.36% from 1.48% in the fourth quarter of 2020. This rise in default probability can be broken down by cause to deteriorating corporate earnings (0.41%p) from economic slowdown and the correction of financial imbalances (0.47%p)[19] (Figure Ⅱ-10).

The rise in the probability of default on corporate loans is estimated to lead to a total credit loss of KRW 27.5 trillion, which exceeds the baseline credit losses of KRW 8.7 trillion by KRW 18.8 trillion (contribution of the correction of financial imbalances: KRW 10.0 trillion, contribution of economic slump: KRW 8.8 trillion). The ratio of credit losses relative to the total balance of corporate loans (KRW 1,755 trillion) is estimated at 1.6%, significantly higher than the corresponding figure for the household sector (0.7%). The credit loss ratio on corporate loans was uniformly higher than that on household loans across all types of financial institutions.[20]

19) The reason why the corporate sector is more severely impacted by the correction of financial imbalances is that a persistent economic downturn worsens borrowing conditions for them by increasing credit reticence in the financial markets and driving up the cost of funding.

20) The ratio of credit losses relative to the total loan balance in the household and corporate sectors stood at 0.4% and 1.6% for banks, 2.2% and 2.8% for mutual savings banks, 0.4% and 1.1% for mutual credit cooperatives and 0.2% and 1.6% for insurance companies, respectively.

4. Assessment and implications

The recent buildup of financial imbalances is contributing to an increasing downside risk to the real economy. Going forward, the effect of accumulated financial imbalances on downside risks to the real economy is likely to depend on the extent and speed of their correction as well as whether the economy continues on its recovery path.[21]

For the time being, however, the impact of downside risks to economic growth, even if they materialize amid accumulated imbalances, is still expected to be limited[22], given the sound level of resilience among financial institutions. Nevertheless, if financial imbalances continue to build up for an extended period of time to reach the level during the global financial crisis, this could make the negative impact of a shock, either domestic or external, sizeable. If a slowing economy leads to tumbling asset prices, increased credit risk for financial institutions and reduced credit availability, imbalances could undergo a sudden correction, causing asset prices to further drop. Moreover, as the resilience of the financial system is weakened by rising credit and market losses, there could also be the risk of contagion losses resulting from losses by a small number of insolvent institutions spreading to other institutions or financial sectors.

Given the above findings, in a situation where the COVID-19 pandemic is still far from over and considerable uncertainty remains as to its future path, it is paramount to closely monitor the extent and speed of accumulation of financial imbalances.[24] Mindful of the risk that accumulated financial imbalances present to financial stability and the macro-economy, timely policy efforts must be made from various angles to stem their further increase.

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21) A swift economic recovery characterized by faster GDP growth can contribute to reducing downside risks to the real economy.

22) A stress test was also conducted to evaluate the impact of an adverse shock at the current level of financial imbalances. The results suggested that, in spite of a measurable increase in credit and market losses of financial institutions, there would be no undue impact on their level of resilience, with average capital ratios remaining above the regulatory minimums across all types of institutions. For more on this issue, refer to <Appendix> 「Results of the Stress Test on the Capital Adequacy of Financial Institutions at the Current Level of Financial Imbalances」(page 151).

23) As part of its oversight of financial stability, the Bank of Korea plans to more closely monitor the buildup of imbalances across different sectors of the financial system. Meanwhile, the newly-developed Financial Vulnerability Index (FVI) is expected to be particularly useful for rapidly and accurately assessing the level of financial imbalances.

Appendix

Results of the Stress Test on the Capital Adequacy of Financial Institutions at the Current Level of Financial Imbalances

An additional stress test was conducted under a scenario in which downside risks to growth, estimated based on the FVI (58.9) at the current point in time (Q1 2021), materialize (annualized rate of -0.8%, lower-10th percentile GaR). The responses of macroeconomic variables to the growth shock were estimated using the scenario generation model, and the correction of financial imbalances, including the drop in asset prices, was assumed to be less extensive than in the main test (Table II-5, Table II-6).

Table II-5. Scenarios[2] for the semiannual GDP growth rate[1]

(%)

	H2 2021	H1 2022
baseline	4.2	3.2
After-shock	0.1	-1.7

Notes: 1) Year-on-year basis.
2) Annualized growth rate is 3% for baseline scenario (BOK, as of May 2021) and -0.8% for after-shock scenario.

Table II-6. Scenarios[1] for major financial market indices

(%, bp)

	Q1 2021	Scenario Average of test period	Scenario Maximum decrease[2]
Share prices	3,076	2,801	2,642
Change[3] in housing prices	5.0	-0.5	-1.6
Treasury bond (3-yr) spreads[4]	51	75	81
Corporate bond (3-yr) spreads[5]	50	149	135

Notes: 1) Quarterly average basis.
2) Maximum increase for spreads.
3) Based on housing sales prices; year-on-year basis.
4) Treasury bond (3-yr) yield - call rate.
5) Corporate bond (3-yr) yield - Treasury bond (3-yr) yield.

The results indicated that at the current level of financial imbalances, even if downside risks to the real economy materialize, the impact on the financial system is likely to be limited. The resilience of financial institutions is expected to continue to remain sound despite an increase in credit losses (KRW 24.6 trillion) and market losses (KRW 28.5 trillion) (Table II-7, Figure II-11).

Table II-7. Estimated credit losses and market losses by financial institution sector[1][2]

(trillion won, %)

Sector	Market losses (A)	Loans balance (B)	A / B × 100
Total	24.6 (37.1)	3,178.9	0.8 (1.2)
Banks	14.6 (23.6)	2,117.2	0.7 (1.1)
Mutual savings banks	1.6 (2.0)	77.6	2.1 (2.6)
Mutual credit cooperatives	2.8 (3.7)	544.3	0.5 (0.7)
Credit card cos.	3.3 (4.0)	126.2	2.6 (3.2)
Insurance cos.	1.3 (2.3)	253.0	0.5 (0.9)
Securities cos.	0.9 (1.6)	60.6	1.4 (2.6)

(trillion won, %)

Sector	Market losses (A)	Securities balance (B)	A/B×100
Total	28.5 (76.0)	1,390.1	2.1 (5.5)
Banks	2.4 (6.3)	375.5	0.6 (1.7)
Mutual savings banks	0.0 (0.0)	2.7	0.7 (1.7)
Mutual credit cooperatives	0.0 (0.1)	11.6	0.2 (0.7)
Credit card cos.	0.2 (0.5)	4.5	5.2 (11.9)
Insurance cos.	25.0 (63.6)	637.1	3.9 (10.0)
Securities cos.	0.9 (5.5)	358.7	0.2 (1.5)

Notes: 1) Based on cumulative losses during the test period.
2) Figures within parentheses are stress test results of accumulated financial imbalances.

Sources: Financial institutions' business reports.

Figure II-11. Scenario test results[1]
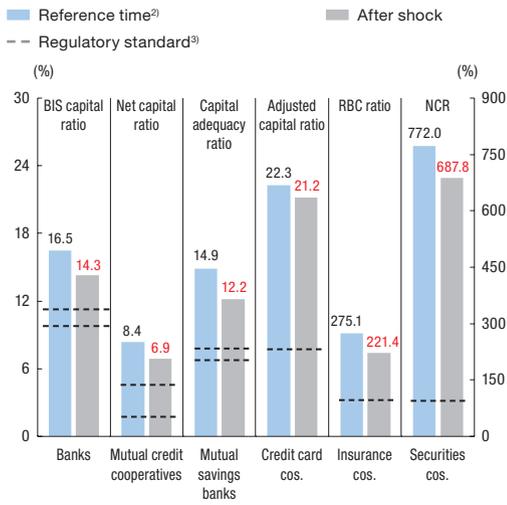
Legend:
- Reference time[2] (light blue)
- After shock (gray)
- Regulatory standard[3] (dashed line)

Left axis (%): 0, 6, 12, 18, 24, 30
Right axis (%): 0, 150, 300, 450, 600, 750, 900

Category	Reference time	After shock
Banks — BIS capital ratio	16.5	14.3
Mutual credit cooperatives — Net capital ratio	8.4	6.9
Mutual savings banks — Capital adequacy ratio	14.9	12.2
Credit card cos. — Adjusted capital ratio	22.3	21.2
Insurance cos. — RBC ratio	275.1	221.4
Securities cos. — NCR	772.0	687.8

Notes: 1) Banks, mutual credit cooperatives, mutual saving banks,
and credit card companies are on the left side; insurance
companies and securities companies are on the right side.
2) Reference time is the end of Q4 2020.
3) Regulatory standards: 10.5% for banks (11.5% for D-SIBs),
2-5% for mutual credit cooperatives, 7% for mutual savings
banks (8% for institutions with assets of more than 1 trillion
won), 8% for credit card companies, and 100% for insur-
ance companies and securities companies.

III. Assessment of Vulnerable Household Segments and Implications

1. Background

The prolonged COVID-19 pandemic has taken a toll on the income conditions of households by worsening employment conditions and causing a significant decline in sales of the self-employed and small businesses. Meanwhile, growing demand for asset investment has fueled accelerated growth in household loans amid an accommodative credit environment, created by the efforts of the government and financial institutions to ease the financial impact of COVID-19 (Figure Ⅲ-1).
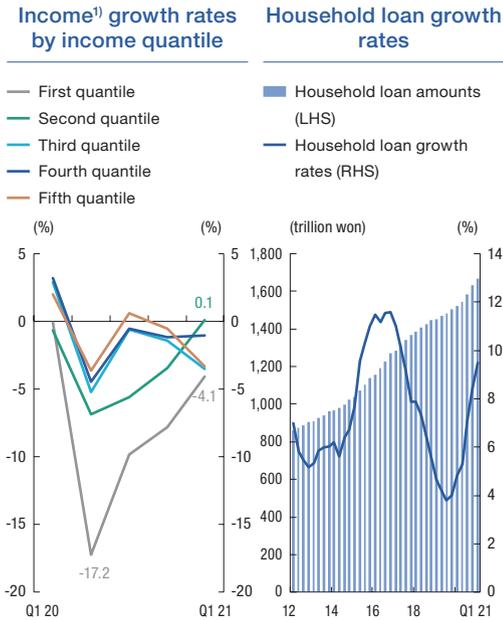
Although the delinquency rate on household loans remains stable for the moment thanks to the various forbearance and deferment programs by the government, the possibility cannot be ruled out that a rise in interest rates[1] or another type of adverse domestic or external shock could cause it to rapidly climb, starting in the vulnerable segments of the household sector.

In this article, a close examination is conducted of loans to the vulnerable segments of the household sector, including vulnerable borrowers[2] and borrowers with a high debt service ratio (DSR),[3] and their delinquency status and characteristics, based on the data of the Household Debt DB and the results of the Survey of Household Finances and Living Conditions, to derive policy implications.

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1) As the ongoing concerns about the massive fiscal expansion by the US government causing a spike in inflation have been borne out by high inflation figures in recent months, there is a growing expectation in the market that the US Federal Reserve will move to raise the federal funds rate.

2) For the purpose of this article, vulnerable borrowers are borrowers with multiple loans (loans from three or more financial institutions) who, furthermore, have low income (bottom 30%) or a low credit rating (a credit score of 664 or below).

3) The DSR was calculated using the standard formula under the guidelines by the Financial Services Commission. Specifically, interest payments were calculated by applying actual loan interest rates to the outstanding balance of principal. Principal payments were estimated as monthly installments based on the length of loan maturity. When maturity information was not available, 15 years were used for home mortgage loans and 10 years for unsecured loans and non-home mortgage loans. For leasehold deposit loans, debt servicing was assumed to consist only of interest payments. DSRs below the standard DSR of 40% (ceiling prescribed by the regulatory authorities) were considered 'low', DSRs above 40% but below 70% 'medium', and DSRs of 70% and above 'high'.

Figure Ⅲ-1. Household income conditions and loan growth rates

Income[1] growth rates by income quantile | Household loan growth rates

- First quantile
- Second quantile
- Third quantile
- Fourth quantile
- Fifth quantile

- Household loan amounts (LHS)
- Household loan growth rates (RHS)

Note: 1) Labor and business income based.
Sources: Bank of Korea, Korea Statistics Household Trend Survey.

ers have improved amid the low interest rate environment.[4]

Figure Ⅲ-2. Trends of vulnerable borrowers

Proportion of vulnerable borrowers | Proportion by type

- Number of borrowers basis
- Debt basis

- Multiple·low income
- Multiple·low credit
- Multiple·low income·low credit
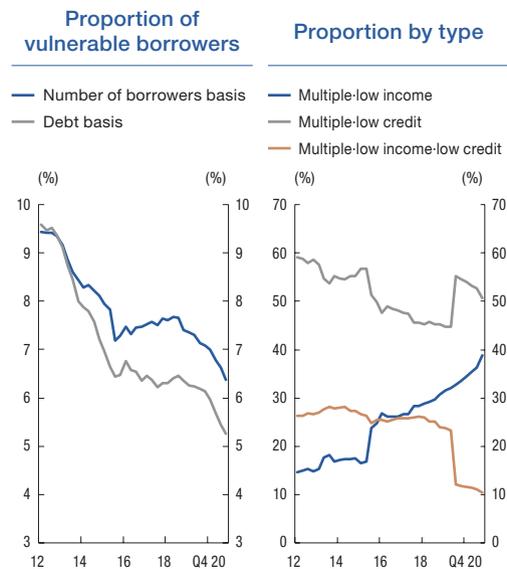

Source: Bank of Korea (Consumer Credit Panel).

2. Vulnerable segments of the household sector

A. Vulnerable borrowers

The number of vulnerable borrowers and their share of total loans have fallen steadily in Korea to stand at 6.4% and 5.3% at the end of the fourth quarter of 2020. This appears to be due to the fact that in recent years, financial institutions have primarily increased loans to high credit borrowers, on the one hand, and on the other, the credit ratings of low credit borrow-

By type of vulnerable borrower, the proportion of low credit borrowers with multiple loans decreased from 58.6% at the end of 2012 to 50.7% at the end of 2020, and the proportion of low income borrowers with multiple loans dropped from 26.6% to 10.5% during the same period. On the other hand, the proportion of low income borrowers with multiple loans rose sharply from 14.9% to 38.9% as a significant number of low income borrowers who previously had a single loan contracted new loans and were, as a result, re-classified as borrowers with multiple loans[5] (Figure Ⅲ-2).

4) For more on this subject, refer to <Box 2> 「Recent Status of the Unsecured Household Loan Market and Implications」(page 33, footnote 3).

5) Of the total borrowers newly classified as low income borrowers with multiple loans in the first to third quarters of 2020, 74.4% were low income borrowers with a single loan during the immediately preceding quarter and 20.6% were middle to high income borrowers with multiple loans.

By type of financial institution, at the end of the fourth quarter of 2020, non-bank loans accounted for 61.7% of all loans to vulnerable borrowers, far above the share of loans to non-vulnerable borrowers in total non-bank loans (39.3%).

By loan type, while the share of home mortgage loans (34.5%) relative to the share of non-home mortgage loans (11.1%) was lower among vulnerable borrowers than among non-vulnerable borrowers (44.5% and 15.1%), the shares of unsecured and other loans[6] (22.6% and 31.8%) were significantly higher among them than among non-vulnerable borrowers (20.0% and 20.5%). Of the total other loans, the share of card loans (7.5%) was particularly large among vulnerable borrowers, compared to non-vulnerable borrowers (2.0%), making credit risk higher for this segment of borrowers (Figure Ⅲ-3).

Figure Ⅲ-3. Lending configuration for vulnerable borrowers
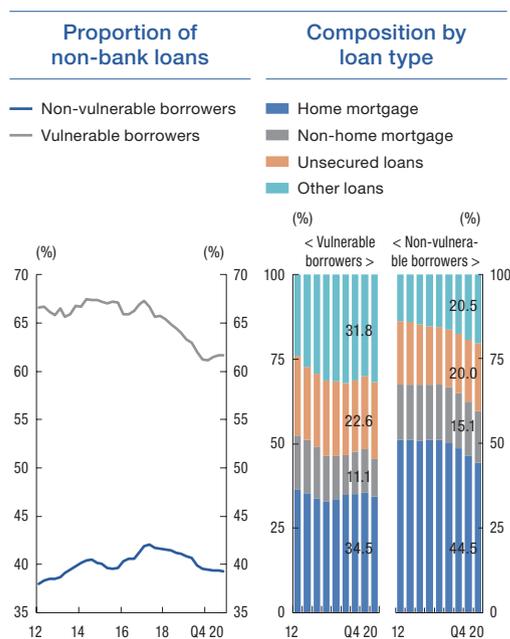
Source: Bank of Korea (Consumer Credit Panel).

B. High DSR borrowers

The average DSR among all borrowers recorded a modest rise in 2015-2016,[7] fluctuated thereafter within the 40% range, and then inched down slightly in 2019, brought down by lower interest rates[8] and longer maturities on home mortgage loans.[9] The average DSR of high DSR borrowers showed a particularly significant decline starting in 2019 as their debt service burdens tend to be large and hence more sensitive to fluctuations in interest rates. The recent tightening in lending rules also contributed to this result.[10] However,

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6) Including leasehold deposit loans, creditcard loans, other secured loans and auto installment loans.

7) This rise appears to have been caused mainly by an increase in housing-related loans amid an easing of real estate lending regulation in this period.

8) The loan interest rate of deposit-taking banks (weighted average, balance basis) mostly continued on a downward trend since the first quarter of 2019 (3.65%) to slip to 2.77% in the fourth quarter of 2020.

9) The average length of maturity on home mortgage loans (weighted average, balance basis) increased from 20.7 years at the end of 2017 to 24.5 years at the end of the fourth quarter of 2020.

10) Ahead of the entry into effect of the new DSR rules, financial institutions preemptively applied a lower DSR, particularly on loans to high DSR borrowers. In addition, the revision of the Consumer Credit Panel (updating of the income data of some high DSR borrowers, Q3 2019) also contributed to the drop in the DSR of high DSR borrowers.

the average DSR among these borrowers still remains quite high at 144%, compared to the corresponding average among medium to low DSR borrowers.

Meanwhile, the number of high DSR borrowers and their share of total loans edged down slightly after 2019 to stand at 13.5% and 39.7%, respectively, at the end of the fourth quarter of 2020 (Figure Ⅲ-4).

Figure Ⅲ-4. Trends of DSR
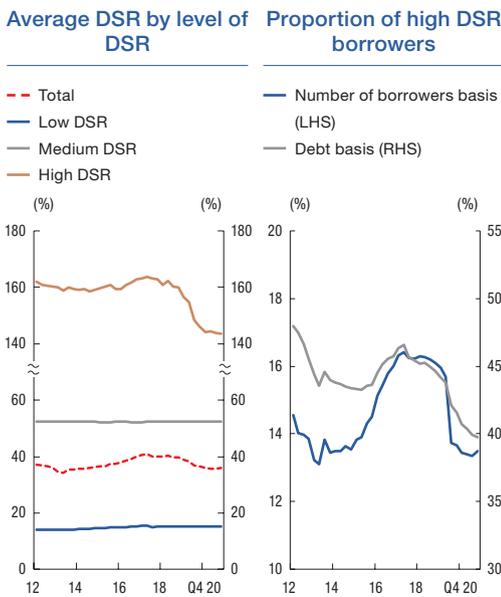
Source: Bank of Korea (Consumer Credit Panel).

By type of financial institution, similarly to the pattern among vulnerable borrowers, the share of non-bank loans was sharply higher in total loans to high DSR borrowers (52.4% at the end of the fourth quarter of 2020) than the corresponding share among medium to low DSR borrowers (32.6%).

By loan type, unlike the pattern among vulnerable borrowers, secured loans (home mort-

gage loans and non-home mortgage loans) accounted for a larger share of total loans to high DSR borrowers (74.9% at the end of the fourth quarter of 2020) than the corresponding share among medium to low DSR borrowers (48.3%). The share of non-home mortgage loans in total loans to high DSR borrowers (28.9%) exceeded the corresponding share in total loans to medium to low DSR borrowers (5.7%) by a particularly large margin. Amid a tightening in housing market regulations, there was an increased demand for non-home mortgage loans as the high ceiling on loans secured against commercial real estate[11] made them more attractive. As a result, their share in total loans to high DSR borrowers was lifted from 27.9% at the end of 2017 to 28.9% at the end of 2020 (Figure Ⅲ-5).

Figure Ⅲ-5. Lending configuration of high DSR borrowers
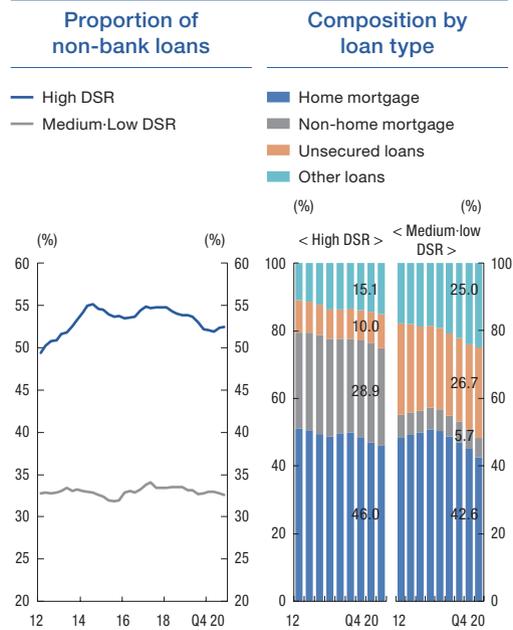
Source: Bank of Korea (Consumer Credit Panel).

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11) The LTV ratio for commercial real estate mortgage loans (70%) is higher than for home mortgage loans.

C. Relationship between vulnerable borrowers and high DSR borrowers

The distribution of vulnerable and non-vulnerable borrowers across DSR segments showed that 34.4% of vulnerable borrowers had a DSR of 70% or higher, while this percentage was only at 12.1% for non-vulnerable borrowers (as of the end of the fourth quarter of 2020), indicating that there is a greater likelihood for a vulnerable borrower to be a high DSR borrower than for a non-vulnerable borrower.

By DSR range, vulnerable borrowers, who made up only 3.8% of all borrowers with a DSR below 40%, accounted for 21.8% of all borrowers with a DSR of 200% or higher, indicating that the share of vulnerable borrowers increases with the rise in DSR (Figure Ⅲ-6).

Figure Ⅲ-6. Relationship[1] between vulnerable borrowers and high DSR borrowers
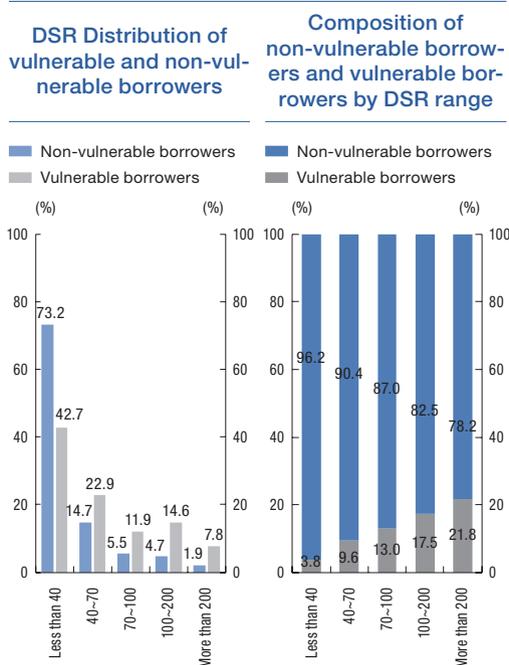
Note: 1) Q4 2020 basis.

Source: Bank of Korea (Consumer Credit Panel).

3. Delinquency rates on vulnerable loan segments

A. Overview

Household loan delinquency rates were estimated using a probability of default model as defaults are closely related to delinquencies. The results showed that while the delinquency rate was negatively correlated with economic growth and asset prices (stock and housing prices, etc.), it was positively correlated with interest rates.[12] Amid a prolonged low interest rate environment, as asset prices continue their upward march, the delinquency rate on household loans has been declining.[13]

The delinquency rate among vulnerable borrowers, which rose above 10% in 2012-2013, also fell to 6.4% at the end of 2020 as the debt service burden was reduced by lower loan interest rates. Nevertheless, this is still significantly higher than the delinquency rate among non-vulnerable borrowers (0.27%).

The breakdown of delinquency rates by type of vulnerable borrower indicated that low credit borrowers with multiple loans accounted for the vast majority of delinquent loans,[14] while low income borrowers with multiple loans (who are not low credit borrowers) accounted for only a negligible share[15] (Figure Ⅲ-7).

Figure Ⅲ-7. Delinquency rate of vulnerable borrowers
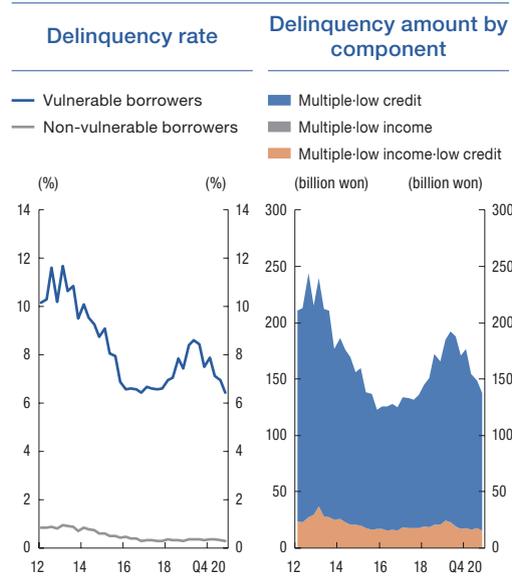
Source: Bank of Korea (Consumer Credit Panel).

The delinquency rate among high DSR borrowers similarly dropped to stand 0.8% at the end of the fourth quarter of 2020, helped by

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12) When a probability of default model for banks' household loans (Q1 2008-Q3 2020) was estimated using the rate of real economic growth (quarterly growth, seasonally-adjusted, 4-quarter moving average), interest rate volatility (CD yield at maturity), stock price volatility (quarterly average value of KOSPI) and the rate of real housing price growth (realized by consumer prices, 4-quarter moving average) as the explanatory variables, the probability of default showed a significant negative correlation with real economic growth, stock price volatility and real housing price growth and a significant positive correlation with interest rate volatility.

13) The household loan delinquency rate (based on annual reports by financial institutions) steadily declined from 0.89% in Q1 2020 → 0.83% in Q2 2020 → 0.77% in Q3 2020 → 0.65% in Q4 2020.

14) The high delinquency rate on loans to low credit borrowers with multiple loans is in large part due to the fact that a delinquent account often leads to the downgrading of a borrower to a low credit borrower.

15) When broken down by the number of financial sectors that households borrowed, credit rating and income of the borrower (based on all borrowers, as of the end of the fourth quarter of 2020), the delinquency rate was higher among borrowers with multiple loans (1.0%) and low credit borrowers (16.2%) than borrowers with only one loan (0.4%) and medium to high credit borrowers (0.001%). The delinquency rate among low income borrowers (0.8%), while higher than the delinquency rate among high income borrowers (0.4%), was roughly the same as the corresponding rate among middle income borrowers (1.0%).

the continuously accommodative financial environment, albeit still rather high compared to the corresponding figure among medium to low DSR borrowers (0.5%). Past data on the relationship between the DSR and the delinquency rate (quarterly simple average of delinquency rates by DSR range in 2012-2020) also corroborate the pattern in which the delinquency rate increases with rising DSR, suggesting that the heavier the debt service burden, the higher the probability of non-performance of debt obligations (Figure Ⅲ-8).

Nevertheless, the share accounted for by vulnerable segments in terms of number of delinquent borrowers was much lower at 55.8%, suggesting that delinquencies in vulnerable segments often involve large value loans (Figure Ⅲ-9).

Figure Ⅲ-9. Composition of delinquent borrowers
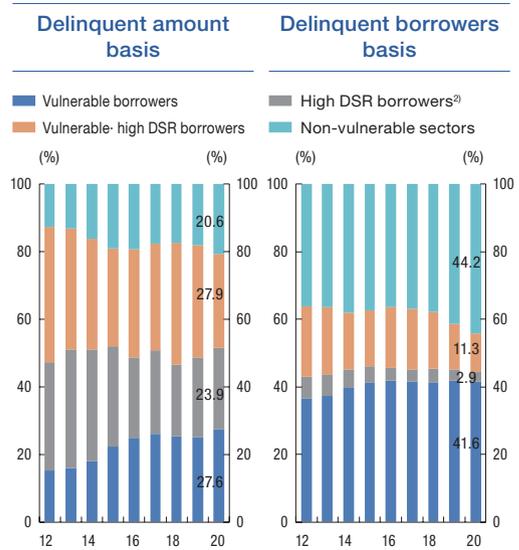
Notes: 1) Exclude vulnerable borrowers applicable high DSR borrowers.
2) Exclude high DSR borrowers applicable vulnerable DSR borrowers.
Source: Bank of Korea (Consumer Credit Panel).

Figure Ⅲ-8. Delinquency rate by DSR level

Note: 1) Simple average of delinquency rates by DSR range every quarter between 2012-20.
Source: Bank of Korea (Consumer Credit Panel).

Meanwhile, of the total delinquent amount, the shares accounted for by vulnerable borrowers and high DSR borrowers (as of the end of the fourth quarter of 2020) were 55.5% and 51.8%, respectively. The combined share of all vulnerable segments was nearly 79.4%, indicating that the majority of delinquencies occurred in vulnerable segments.

B. Characteristics of delinquent borrowers in vulnerable segments

(High DSR borrowers: relatively low delinquency rate)

The delinquency rate among high DSR borrowers is lower than among vulnerable borrowers despite their high debt service burden.

This is, first of all, because these borrowers tend to own financial assets to tap if their income falls short of their debt service require-

ments. According to the Survey of Household Finances and Living Conditions, a significant portion of borrowers with a DSR of 70% or higher own financial assets that are worth 21-38% of their financial liabilities and 105-174% of their annual debt service requirements. In other words, many of them are capable of meeting their debt service requirements for a year or longer through the liquidation of financial assets alone.

The composition of financial assets by DSR range showed that high DSR borrowers hold 50-60% of their total assets in the form of bank deposits. Moreover, as their holdings in stocks or mutual funds are also negligible, the liquidation of assets, should it become necessary for them to be able to repay their debt, is unlikely to entail significant market losses (Figure Ⅲ-10).

Figure Ⅲ-10. Financial assets by level DSR
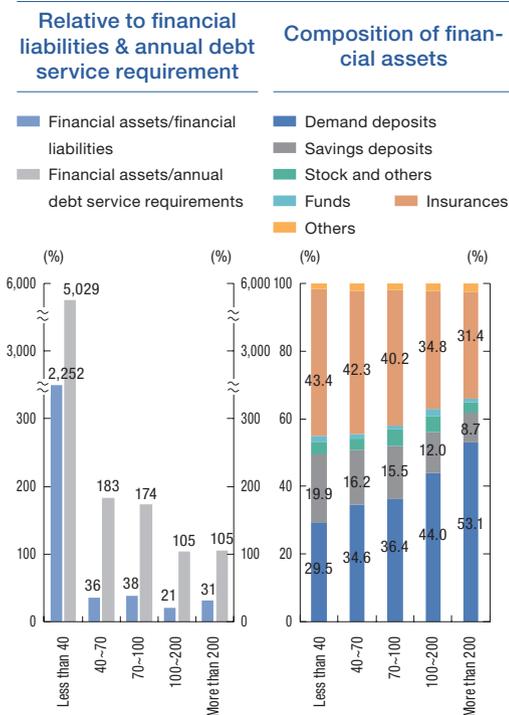
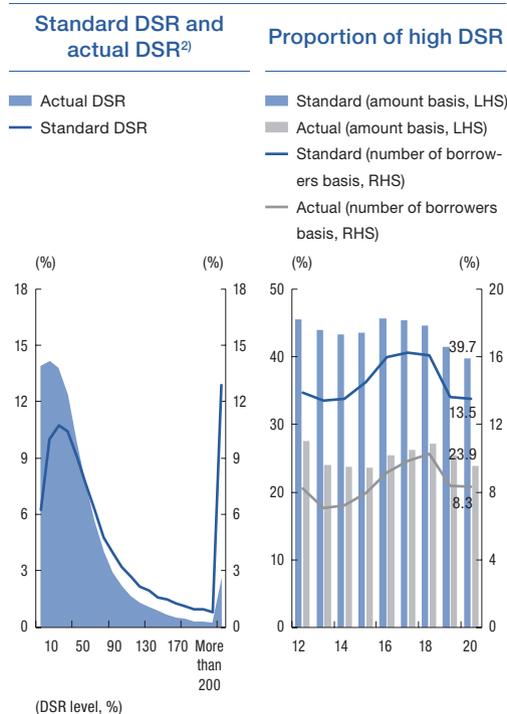Source: Korea Statistics Household Financial Welfare Survey.

Secondly, a DSR based on the actual debt service burden, which takes into account all additional income of high DSR borrowers, could be significantly lower. In terms of income (denominator of the DSR), as of the end of the fourth quarter of 2020, as much as 28.9% of loans to high DSR borrowers were loans secured against commercial real estate that generates rental income. The calculation of the DSR at the time of the issuance of non-home mortgage loans is most often based only on the current income of high DSR borrowers and does not include the future rental income that may be generated from the commercial property. If such future rental income is included in the calculation, their DSR will be significantly lower.

Moreover, in terms of debt service requirements (numerator of the DSR), although all debt service requirements reflected in the calculation of the DSR are supposed to be equal monthly installments, in reality, most loans include some components that are not repaid through installments.[16] Excluding these components from the total yearly principal and interest payment will bring down the debt service burden of high DSR borrowers to a level below the standard DSR. However, given that the current method for its calculation takes into account rollover risk, the standard DSR still appears to be a more suitable indicator from the point of view of macroprudential management.

Therefore, when, based on these considerations, the average DSR of borrowers of a non-home mortgage loan was calculated by adding the estimated rental income from the property[17] to the income indicator and excluding the principals of loan components that are not

actually paid through installments from the principal and interest payment (numerator), the DSR of high DSR borrowers was sharply lower, which also had the effect of substantially reducing their share of total loans (loan value basis) to 23.9% from 39.7% (Figure Ⅲ-11).

Figure Ⅲ-11. Changes[1] in DSR by DSR calculation method

Standard DSR and actual DSR[2]	Proportion of high DSR

Actual DSR
— Standard DSR

■ Standard (amount basis, LHS)
■ Actual (amount basis, LHS)
— Standard (number of borrowers basis, RHS)
— Actual (number of borrowers basis, RHS)

Notes: 1) Q4 2020 basis.
2) Reflect the estimated rental income of the borrowers in the denominator in the standard DSR, excluding principal not actually repaid numerator.

Source: Bank of Korea (Consumer Credit Panel).

(High delinquency entry and persistence rates)

The rate of vulnerable borrowers and high DSR borrowers transitioning from non-delinquency to delinquency (delinquency entry rate)[18] was markedly higher than the corresponding rate in the non-vulnerable segments of borrowers. Likewise, the rate of persistence in delinquency after newly becoming delinquent (delinquency persistence rate)[19] was also higher among high DSR borrowers, compared to borrowers in non-vulnerable segments.

In 2015-2018, the delinquency entry rate by non-delinquent vulnerable borrowers, estimated based on the data of the fourth quarter of each year, sharply rose over the span of a year to reach 6.1% (average) and decreased somewhat three years later to 5.0%. The delinquency entry rate of high DSR borrowers climbed to 2.0% within a year and then edged up slightly three years later to 2.4%. On the other hand, the corresponding rate in the non-vulnerable segments of borrowers, which showed a slow, steady upward trend over the same period, stood at only 1.2% at the end of the third year.

The delinquency persistence rate of newly-delinquent borrowers was also estimated based

16) For example, unlike the assumption made in the calculation of the standard DSR (for an unsecured loan, 10% of the principal is assumed to be paid annually through installments), unsecured loans are often not repaid through installments.

17) For this estimation, the LTV ratio on non-home mortgage loans was assumed to be 70% and the annual rental yield 4%.

18) The delinquency entry rate is the % share of borrowers who were non-delinquent at the point in time accounted for by those who transitioned to delinquency at the point in time.
(Delinquency entry rate = number of non-delinquent borrowers who become newly delinquent /total number of non-delinquent borrowers ×100)

19) The delinquency persistence rate is the % share of borrowers who become newly delinquent at the point in time accounted for by those who remain delinquent at the point in time.
(Delinquency persistence rate= number of newly-delinquent borrowers who remain in delinquency / total number of newly-delinquent borrowers ×100)
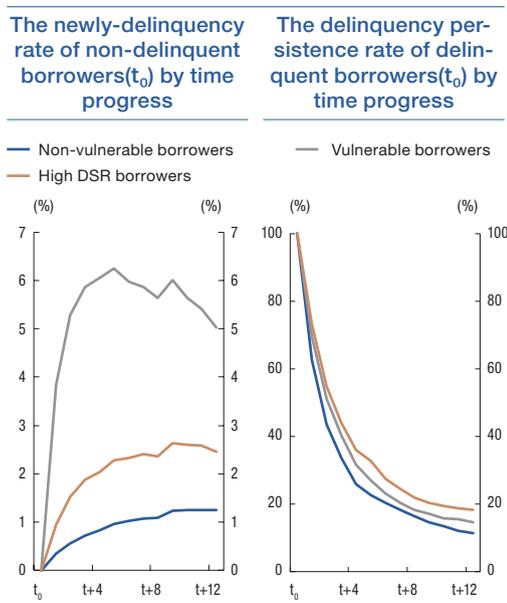
on the fourth quarter data over the three-year period between 2015 and 2018. One year after delinquency entry, the average delinquency persistence rate among newly-delinquent borrowers in non-vulnerable segments was 25.9%, while this figure was much higher for high DSR borrowers at 36.0%. The delinquency persistence rate three years after delinquency entry was also higher for high DSR borrowers (18.5%) than non-vulnerable borrowers (11.4%), suggesting that once high DSR borrowers become delinquent, transitioning out of delinquency is more difficult for them due to their high debt service burden (Figure Ⅲ-12).

Figure Ⅲ-12. The newly-delinquency rate and the delinquency persistence rate[1] of vulnerable sectors

The newly-delinquency rate of non-delinquent borrowers(t_0) by time progress	The delinquency persistence rate of delinquent borrowers(t_0) by time progress

- Non-vulnerable borrowers
- High DSR borrowers
- Vulnerable borrowers

Note: 1) Average of newly-delinquency rate and the delinquency persistence rate based on every Q4, 2015-18.
Source: Bank of Korea (Consumer Credit Panel).

(Sensitivity to interest rate volatility)

The delinquency rate appears to be more influenced by fluctuations in market interest rates in the vulnerable segments of borrowers than non-vulnerable segments. During the recent period (Q2 2019-Q4 2020) of falling interest rates (weighted average loan interest rate of deposit-taking banks), while the delinquency rates among vulnerable borrowers and high DSR borrowers fell by 2.1%p and 0.4%p from 8.5% and 1.1%, respectively, the corresponding rates among non-vulnerable borrowers and medium and low DSR borrowers remained virtually unchanged (0.4% and 0.6% → 0.3% and 0.5%).
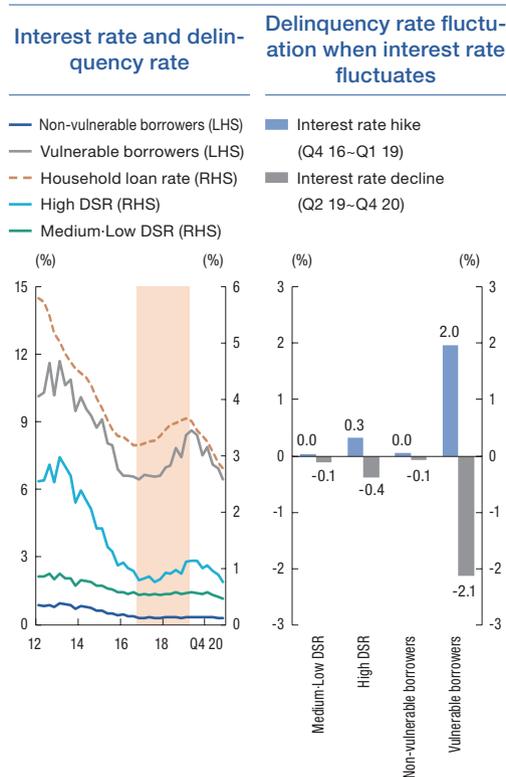
Meanwhile, during the period of rising interest rates (Q4 2016-Q1 2019), the delinquency rates among vulnerable borrowers and high DSR borrowers edged higher from 6.4% and 0.8% to 8.4% and 1.1%, respectively, while this rate stayed stable in the non-vulnerable segments of borrowers (0.3% and 0.5% → 0.3% and 0.6%) (Figure Ⅲ-13).

Figure Ⅲ-13. Interest rate[1] and delinquency rate

Interest rate and delinquency rate

Delinquency rate fluctuation when interest rate fluctuates

- Non-vulnerable borrowers (LHS)
- Vulnerable borrowers (LHS)
- Household loan rate (RHS)
- High DSR (RHS)
- Medium·Low DSR (RHS)

■ Interest rate hike (Q4 16~Q1 19)
■ Interest rate decline (Q2 19~Q4 20)

Note: 1) Weighted average loan rate of deposit banks (balance basis).
Source: Bank of Korea (Consumer Credit Panel).

Such a marked rise in the delinquency rate of vulnerable borrowers during periods of higher interest rates appears to be due to the large debt service burden borne by these borrowers,[20] which make the increase in interest payments sizeable. As a high percentage of loans to vulnerable borrowers are variable rate loans,[21] a rise in market interest rates often leads to a rise in loan interest rates. Moreover, a rise in interest rates also increases the spread, a premium based on credit risk, for vulnerable borrowers with low credit ratings, which could cause a further increase in their loan interest rates.[22]

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20) While the share of borrowers with a DSR of 70% or higher was only 12.1% of total non-vulnerable borrowers, the corresponding figure for vulnerable borrowers is as much as 34.4% (as of the fourth quarter of 2020).

21) Compared to non-vulnerable borrowers, non-bank loans represent a higher share of loans to vulnerable borrowers. By loan type, the share of unsecured loans tends to be high and the share of secured loans low. The share of variable rate loans was higher in non-bank loans (85.9%, excluding home mortgage loans by HF) than in bank loans (65.3%). By loan type, the share of variable rate loans was higher in unsecured loans (77.6% for bank loans, 91.5% for mutual credit cooperative loans) than in home mortgage loans (60.4% for bank loans, 72.9% for non-bank loans).

22) In the case of unsecured bank loans, a rise in the benchmark rate appeared to cause interest rate spreads to decrease for high credit borrowers and increase for low credit borrowers. When the contribution of changes in the benchmark rate to changes in spreads across different credit ratings was estimated using the credit rating-based loan interest rate data of the Korean Federation of Banks, during periods of rising interest rates, a higher benchmark rate led to a significant decrease in rate spreads for high credit borrowers (grades 1-4), while it resulted in a significant increase in rate spreads for low credit borrowers (grades 7-10).

[Regression equation] $\Delta AI_{t1,t2} = \alpha + \beta_1 \Delta BI_{t1,t2} + \beta_2 \Delta RATE_{t1,t2} + \beta_3 DATE + \varepsilon$

AI: loan interest rate spread, BI: loan benchmark rate, RATE: average credit rating of a borrower, DATE: dummy variable for each period, $\triangle$: change at the beginning of the period (t1: June 2016) of rising interest rates (t2: January-June 2019).

[Estimation results]

	High credit (grades 1-4)	Medium credit (grades 5-6)	Low credit (grades 7-10)
β1	-1.767	0.012	2.530
(P-value)	0.024	0.992	0.039

4. Implications

While income conditions for households have worsened since the COVID-19 pandemic, with a particularly severe worsening observed in the most vulnerable segments, household loans have increased at a brisk pace, buoyed by the expectation of asset price growth. In spite of this, the delinquency rate on household loans continues to remain at a very low level thanks to the lowering of the base interest rate and various forbearance and deferment programs by the government, with the share of total loans accounted for by vulnerable segments also decreasing.

However, there is a strong possibility that a rise in interest rates in major countries or another type of shock, domestic or external, may cause loan delinquencies to spike, starting in loans to vulnerable borrowers.

This is because, in the event of an adverse shock, the debt service burden tends to increase more sharply for vulnerable borrowers than for others as unsecured loans, sensitive to changes in market interest rates, account for a high share of loans to these borrowers, many of whom furthermore have a low credit rating.

Moreover, when the current forbearance and deferment programs expire and if economic recovery proves to be uneven, delaying improvement in income conditions for low income and other vulnerable borrowers, credit risk could further increase.

It is, therefore, important for financial institutions to develop and implement a lending strategy to ensure that changes in domestic and external conditions do not trigger a sudden rise in delinquencies on loans to vulnerable segments of households. It should be noted that both the delinquency entry and persistence rates are higher in vulnerable segments than in non-vulnerable segments.

Also of note is the fact that commercial real estate loans and other non-home mortgage loans represent a large share of loans to high DSR borrowers. Given that a higher LTV ratio is applied to commercial real estate loans than home mortgage loans and that the soundness of these loans can quickly deteriorate depending on real economic conditions, financial institutions need to pay special attention to the management of associated risk.

IV. The Rise of Vulnerable Firms with Low Interest Coverage Ratios in Korea: Background and Implications

1. Background

In 2020, as corporate sales and profitability were hit by the COVID-19 crisis, the number of domestic firms that were unable to cover their interest expenses from operating income increased substantially. At the end of 2020, the proportion of firms[1] whose interest coverage ratio (operating income/total interest expense), measuring a firm's ability to pay interest on their debt, was below 1 (hereafter "vulnerable firms") stood at 39.7%, surpassing the 33.2% figure recorded at the end of 2008, at the peak of the global financial crisis. Such a rise in the number of vulnerable firms with a weakened debt service capacity hinders the efficient distribution of resources and increases the risk of corporate defaults in the event of an adverse domestic or external shock. This article describes the recent status of vulnerable firms with low interest coverage ratios and analyzes the background to the rise in their numbers from various angles, including the path of transition and financial ratios, to derive policy implications related to corporate financial support and restructuring.

2. Current status of vulnerable firms with low interest coverage ratios

A. Vulnerable firms in Korea

In 2020, vulnerable firms with an interest coverage ratio below 1 accounted for 39.7% (1,001 firms) of all firms analyzed (2,520 firms), up 2.7%p from the level in 2019. Among the total vulnerable firms in 2020, the proportion of firms with an interest coverage ratio of less than 0 due to operating losses (hereafter "vulnerable firms with operating losses") increased by 3.7%p to 32.6%. Meanwhile, the proportion of firms with an interest coverage ratio between 0 and 1 as their operating profits were less than their total interest payment requirements (hereafter "vulnerable firms with underperforming operations") decreased by 1.0%p from the previous year (8.1%) to 7.1%. Meanwhile, the share of loans to vulnerable firms in 2020 is 32.2% (KRW 139.9 trillion) of the financial institution loans (KRW 434.1 trillion) held by the companies analyzed, and the share has been on the rise since 2017. In the case of vulnerable firms with operating losses, their loan share (21.5%) jumped 6.0%p from the previous year as both their number and the average loan value increased. However, the loan share of vulnerable firms with underperforming operations (10.7%) fell by 3.3%p from the level in 2019 (Figure IV-1).

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1) Hereafter based on 2,520 firms (1,276 large enterprises, 1,244 SMEs), including listed firms and some unlisted firms that are required to file business reports as of the end of 2020 in accordance with the Financial Investment Services and Capital Markets Act (excluding financial and insurance industries).

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Figure IV-1. Proportion[1] of vulnerable firms with low interest coverage ratios

■ Vulnerable firms with operating losses
■ Vulnerable firms with underperforming operations

< Based on the number of firms >

< Based on loan amount >
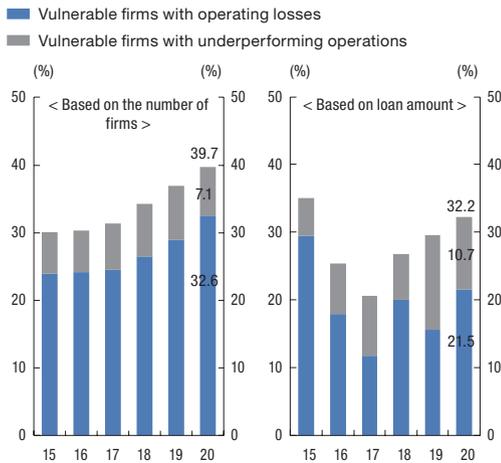
Note: 1) Proportions among the number of firms subject to analysis and the amount of financial institution loans held by firms analyzed in each year.

Sources: KIS-Value, Korea Credit Information Services.

Figure IV-2. Composition[1] of vulnerable firms by size

■ Large enterprises   ■ SMEs

< Based on the number of firms >

< Based on loan amount >
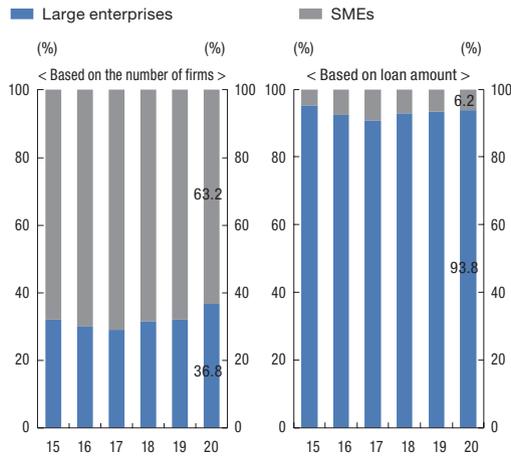
Note: 1) Compositions in the number of all vulnerable firms and the amount of financial institution loans held by vulnerable firms in each year.
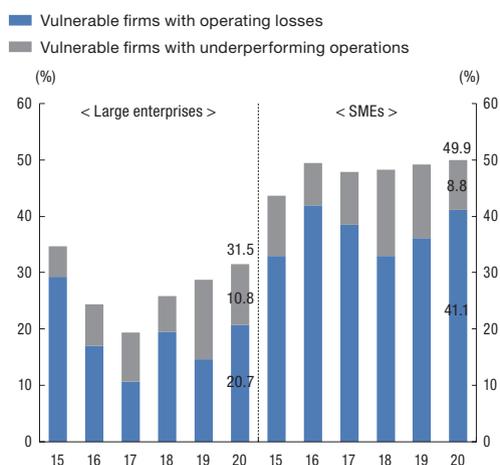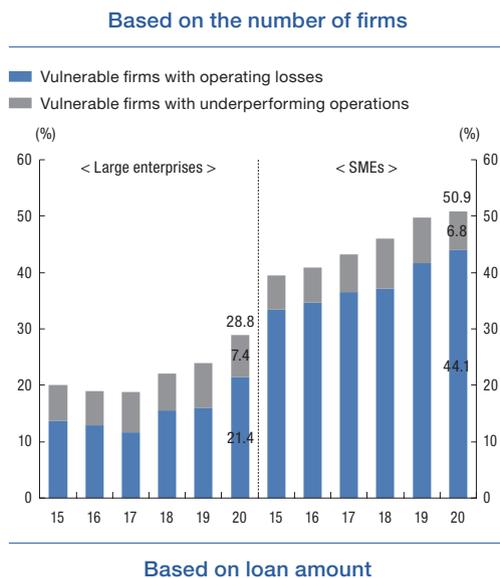
Sources: KIS-Value, Korea Credit Information Services.

By company size, as of 2020, SMEs accounted for 63.2% (633) of all vulnerable firms, based on the number of firms, and 6.2% (KRW 8.6 trillion) of total loans to vulnerable firms, based on loan amount (Figure IV-2). These proportions are significantly higher than the corresponding shares of SMEs among total firms analyzed in this period (49.4% in number of firms, 4.0% in loan amount). However, the share of SMEs among total vulnerable firms in 2020 dropped below the average level of previous years[2] as the number of vulnerable large enterprises increased sharply during this period.

Meanwhile, when the proportion of vulnerable firms by size of firms is examined, 50.9% of all SMEs analyzed in 2020 were vulnerable firms, and it is evaluated that SMEs generally have weaker interest payment ability than large enterprises (28.8%). In 2020, while the proportion of vulnerable firms with underperforming operations was comparable between the two groups (7.4% for large enterprises, 6.8% for SMEs), the proportion of vulnerable firms with operating losses was far greater among SMEs (44.1%) than among large enterprises (21.4%). Based on loan amount, vulnerable firms accounted for 49.9% (KRW 8.6 trillion) of total outstanding loans to SMEs analyzed (KRW 17.3 trillion) and 31.4% (KRW 131.3 trillion) of total outstanding loans to large enterprises (KRW 416.8 trillion) in 2020 (Figure IV-3).

2) Among total vulnerable firms in 2015-2019, SMEs accounted for 69.0% based on the number of firms (31.0% for large enterprises), and 6.7% based on loan amount (93.3% for large enterprises).

Figure Ⅳ-3. Proportion¹⁾ of vulnerable firms by size

Based on the number of firms

■ Vulnerable firms with operating losses
■ Vulnerable firms with underperforming operations

Based on loan amount

■ Vulnerable firms with operating losses
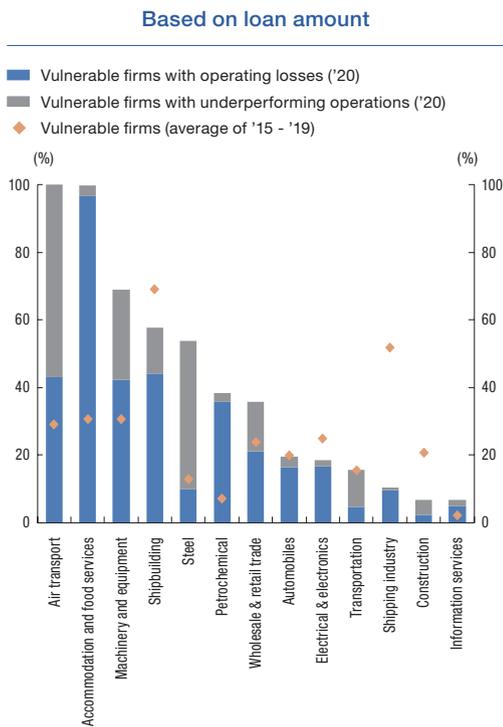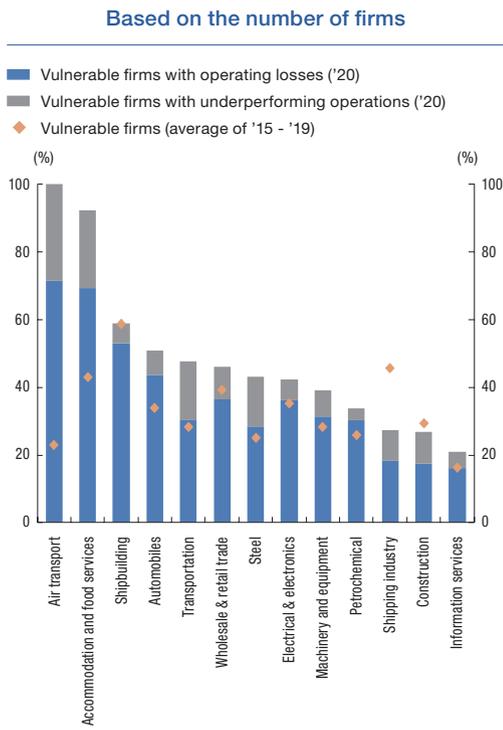■ Vulnerable firms with underperforming operations

Note: 1) Proportions among the number of large enterprises and SMEs subject to analysis and the amount of financial institution loans held by firms analyzed in each year.

Sources: KIS-Value, Korea Credit Information Services.

By industry, the interest coverage ratio of firms in sectors where sales declined sharply following the COVID-19 outbreak, such as air transport and accommodation and food services, fell sharply, lifting the proportion of vulnerable firms in these sectors far above the levels in previous years, both in terms of number of firms and loan amount. The proportion of vulnerable firms also exceeded 50% in sectors such as shipbuilding and automobiles in terms of number of firms, and machinery and equipment, shipbuilding and steel in terms of loan amount (Figure Ⅳ-4).

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Figure IV-4. Proportion[1] of vulnerable firms by industry

Based on the number of firms

- Vulnerable firms with operating losses ('20)
- Vulnerable firms with underperforming operations ('20)
- ◆ Vulnerable firms (average of '15 - '19)

Based on loan amount

- Vulnerable firms with operating losses ('20)
- Vulnerable firms with underperforming operations ('20)
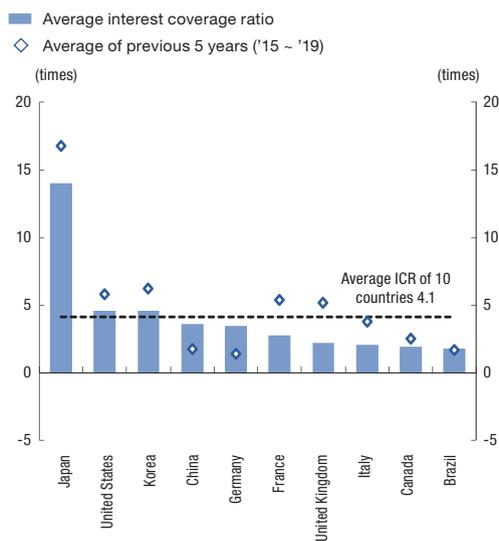- ◆ Vulnerable firms (average of '15 - '19)

Note: 1) Proportions among the number of firms in each industry sub-
ject to analysis and the amount of financial institution loans
held by firms analyzed in each year.

Sources: KIS-Value, Korea Credit Information Services.

B. Comparison with major countries[3]

When compared with the status of vulnerable firms with low interest coverage ratios in other developed and emerging market countries, the average interest coverage ratio among listed firms, standing at 4.6 in 2020, appeared generally favorable. (Figure Ⅳ-5).

Figure IV-5. Average interest coverage ratio[1][2] of major countries

- Average interest coverage ratio
- ◇ Average of previous 5 years ('15 ~ '19)

Notes: 1) 2020 basis.

2) EBIT/interest expenses on debt.

3) Based on simple average of interest coverage ratio for each
country in 2020.

Sources: Bank of Korea's own estimation, Refinitiv.

However, although the proportion of vulnerable firms in Korea based on the number of firms, standing at 36.5% in 2020, was below the corresponding average in major countries (39.7%), their share based on loan amount (30.7%) was in excess of the average among major countries (24.8%). It is evaluated that the proportion of the average credit to vulnerable firms in Korea is relatively high compared to that of major countries (Figure Ⅳ-6).

Figure IV-6. Proportion[2] of vulnerable firms[1] of major countries
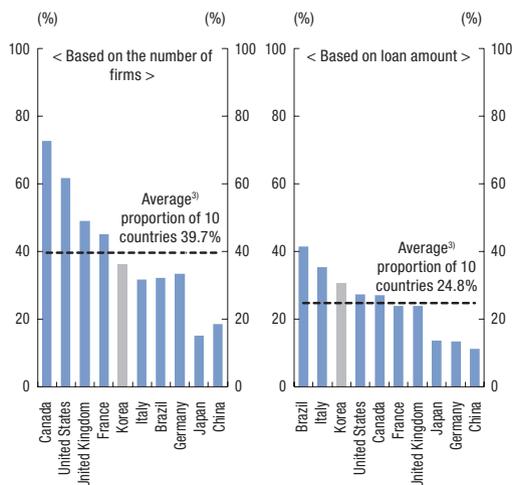
Notes: 1) Firms with interest coverage ratio (EBIT/interest expenses on debt) below 1.
    2) 2020 basis.
    3) Based on simple average of proportions of vulnerable firms based on the number of firms and loan amounts for each country.
Sources: Bank of Korea's own estimation, Refinitiv.

crisis were analyzed by decomposing three factors that change the interest coverage ratio: ① profitability (operating return on assets), ② debt reliance (debt to asset ratio) and ③ average borrowing cost (average interest rate on debt).[4] The results indicated that the rise in vulnerable firms was mainly due to the drop in companies' interest coverage ratio stemming from deteriorating profitability, rather than an increase in debt reliance or borrowing costs.
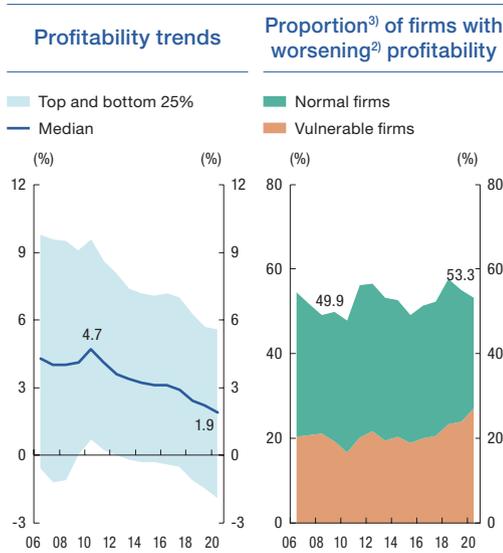
As corporate profitability, which corresponds to the numerator of the interest coverage ratio, has steadily worsened ever since the global financial crisis (median of operating ROA: 4.7% in 2010 → 1.9% in 2020), the proportion of companies whose operating ROA fell compared to the previous year (hereafter "firms with worsening profitability") has gradually increased to recently reach 53.3% in 2020, surpassing the level during the global financial crisis (49.9% in 2009). In 2020, although the proportion of firms with worsening profitability was reduced slightly, the share of vulnerable firms in total firms with worsening profitability rose higher, while the share of firms with an interest coverage ratio of 1 or above (hereafter "normal firms") shrank sharply (Figure IV-7).

3. Causes of the increase in vulnerable firms

A. Deteriorating corporate profitability

The causes of the increase in the number of vulnerable firms since the global financial

3) For the purpose of international comparison, the interest coverage ratio was calculated using EBIT (earnings before interest and taxes) and interest expense on debt, in consolidated financial statements of listed firms in each country. Therefore, the average interest coverage ratio and the proportion of vulnerable firms in Korea are not identical to the corresponding figures reported in earlier statistics.

4) The interest coverage ratio may be decomposed, as in the following equation, into three factors, profitability, debt to asset ratio, and average borrowing cost:

$$\text{Interest coverage ratio} = \frac{\text{Operating income}}{\text{Total interest expense}}$$

$$= \frac{\text{Operating income}}{\text{Total assets}} * \frac{1}{\frac{\text{Total debt}}{\text{Total asset}}} * \frac{1}{\frac{\text{Total interest expense}}{\text{Total debt}}}$$

$$= \text{Profitability(Operating ROA)} * \frac{1}{\text{Debt reliance}}$$

$$* \frac{1}{\text{Average borrowing cost (Average interest rate on debt)}}$$

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Figure IV-7. Corporate profitability[1] trends

Profitability trends	Proportion[3] of firms with worsening[2] profitability

■ Top and bottom 25% ■ Normal firms
— Median ■ Vulnerable firms

Notes: 1) Operating ROA = Operating income/total assets.
   2) Operating ROA fell compared to the previous year.
   3) Proportion of number of relevant firms among all firms subject to analysis in each year.
Sources: Bank of Korea's own estimation, KIS-Value.

Figure IV-8. Trends of firms' debt reliance[1]

Trends of firms' debt reliance	Proportion[3] of firms with increased[2] debt reliance

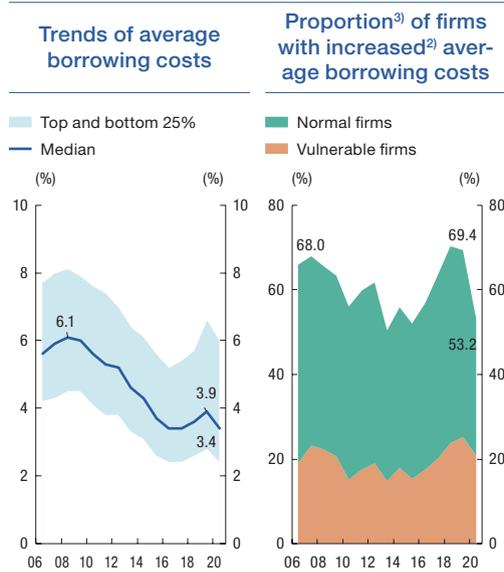■ Top and bottom 25% ■ Normal firms
— Median ■ Vulnerable firms
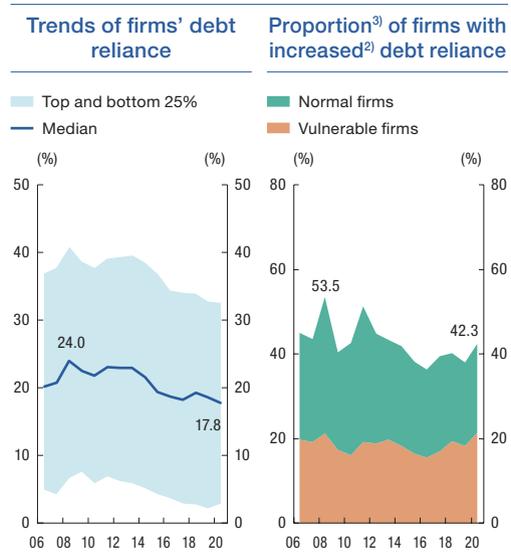
Notes: 1) Debt reliance = Total debt(total borrowing and bonds payable)/total assets.
   2) Debt reliance increased compared to the previous year.
   3) Proportion of number of relevant firms among all firms subject to analysis in each year.
Sources: Bank of Korea's own estimation, KIS-Value.

Meanwhile, the debt reliance of firms, measured by the size of debt (total borrowing and bonds payable) relative to total assets, has been on a downward trend from the global financial crisis until recently (median of debt-to-assets ratios, 24.0% in 2008 → 17.8% in 2020). The proportion of companies whose debt reliance increased compared to the previous year (42.3% in 2020) but still remained well below the level during the global financial crisis (53.5% in 2008) (Figure IV-8).

The average borrowing cost of firms, which affects the denominator of the interest coverage ratio, has been mostly on a decline since the global financial crisis (median of average interest rate on debt, 6.1% in 2008→ 3.4% in 2020). In 2020, the average borrowing cost fell particularly sharply from a year earlier (-0.5%p), affected by the lowering of the policy rate and the interest repayment deferral program launched during this period. An equally sizeable decline was seen in the proportion of firms whose average borrowing cost increased from the previous year (69.4% in 2019 → 53.2% in 2020) (Figure IV-9).

Figure Ⅳ-9. Trends of firms' average borrowing costs[1]

Trends of average borrowing costs	Proportion[3] of firms with increased[2] average borrowing costs

Top and bottom 25%
— Median

Normal firms
Vulnerable firms

Notes: 1) Average interest rate on debt = total interest expense/ total debt.
2) Average borrowing costs increased from the previous year.
3) Proportion of number of relevant firms among all firms subject to analysis in each year.
Sources: Bank of Korea's own estimation, KIS-Value.

B. Prolonged duration of vulnerability

There are three possible outcomes for vulnerable firms depending on the projected interest coverage ratio for the next fiscal year and the status of bankruptcy: ① returning to "normal firm" status (hereafter "normalization"), ② remaining a vulnerable firm (hereafter "persistent vulnerability"), and ③ transitioning to bankruptcy, including going out of business, capital erosion, etc. (hereafter "bankruptcy transition") (Figure Ⅳ-10).

Figure Ⅳ-10. Path of transition
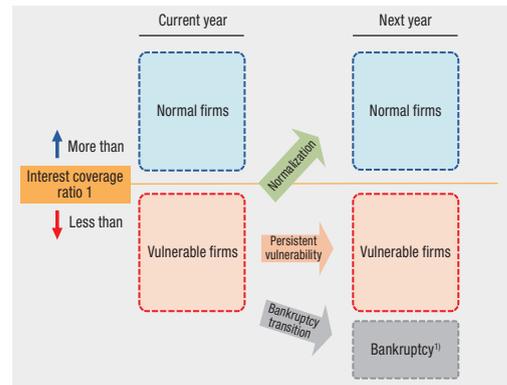
Note: 1) Firms with closure or capital erosion classified as bankruptcies.

As a result of examining vulnerable firms by path of transition from 2006 to 2019, it was found that since the global financial crisis the proportion of firms that persisted in a vulnerable state continuously rose, while that of firms that returned to normal or transitioned to bankruptcy declined or remained stable. The proportion of firms that remained vulnerable in two consecutive years has risen gradually since 2009, reaching 23.6% in 2019, significantly above the level just before the global financial crisis (20.6% in 2007). As for vulnerable firms that returned to normal, their proportion dropped slightly below the level during the global financial crisis. Finally, the proportion of firms that transitioned to bankruptcy was mostly unchanged compared to the past (Figure Ⅳ-11).
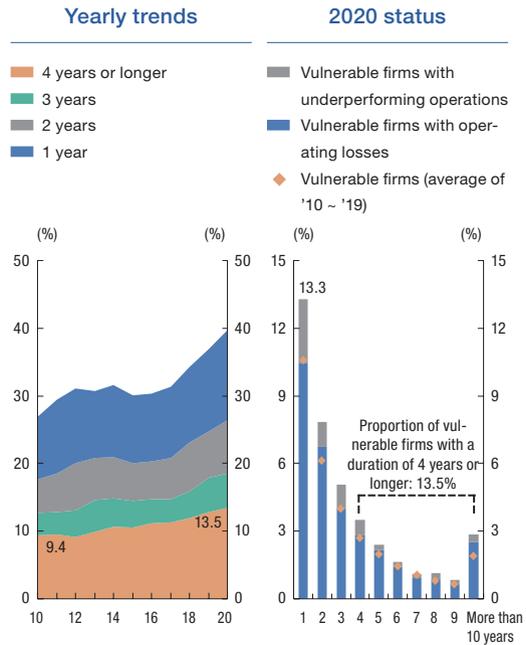
Figure IV-11. Proportion[1] trends[2] of vulnerable firms by path of transition

- Vulnerable firms
- Normalization
- Persistent vulnerability
- Bankruptcy transition
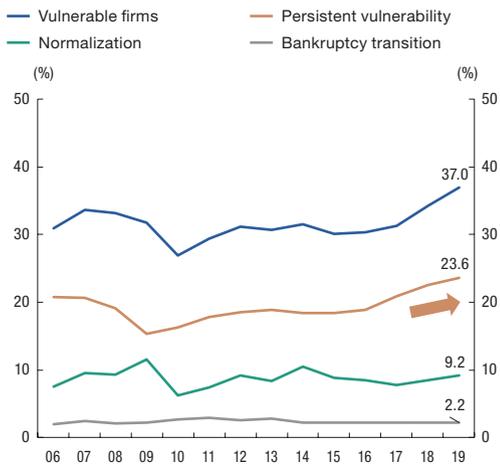
Notes: 1) Proportion of number of relevant firms among all firms subject to analysis in each year.
   2) The sum of the proportions of each path differs from the proportion of the vulnerable firms due to sample deviation.
Sources: Bank of Korea's own estimation, KIS-Value.

Therefore, a considerable number of vulnerable firms that saw their interest coverage ratio dragged down by worsening profitability appear to be unable to transition out of their vulnerable state, but nevertheless remain in business for a significant period of time. When vulnerable firms in 2010-2020 were classified according to the duration of vulnerability, their proportion increased across all segments of duration (one year, two years, three years, four years or longer). The proportion of firms that persisted in a vulnerable state for more than four consecutive years (hereafter "long-term vulnerable firms") rose from 9.4% in 2010 to 13.5% in 2020. Moreover, the share of firms that newly transitioned from a normal to a vulnerable firm during 2020 (one-year duration of vulnerability) stood at 13.3%, substantially higher than the average level of 2010-2019 (10.6%) (Figure IV-12).

Figure IV-12. Proportion[1] of vulnerable firms classified according to the duration of vulnerability

Yearly trends	2020 status

Yearly trends:
- 4 years or longer
- 3 years
- 2 years
- 1 year

2020 status:
- Vulnerable firms with underperforming operations
- Vulnerable firms with operating losses
- Vulnerable firms (average of '10 ~ '19)

Note: 1) Proportion of number of relevant firms among all firms subject to analysis in each year.
Sources: Bank of Korea's own estimation, KIS-Value.

As a result of examining the transition rates of vulnerable firms by duration from 2010 to 2019, it is found that the longer the duration of vulnerability, the lower the rate of return to normal during the following year, while the rate of persistent vulnerability or transition to bankruptcy mostly increased. 37.6% of firms that newly became a vulnerable firm (one-year duration of vulnerability) returned to normal during the following year. On the other hand, only 12.6% of firms that remained vulnerable recovered to see their interest coverage ratio rise to 1 or higher during the following year. Finally, while the rate of vulnerable firms that transition to bankruptcy in the following year was merely 4.1% among firms that are in the first year into vulnerability, it was as much as 13.6% among firms that were in the seventh

year into vulnerability (Figure Ⅳ-13).

Figure Ⅳ-13. Transition rates[1] of vulnerable firms by the duration of vulnerability
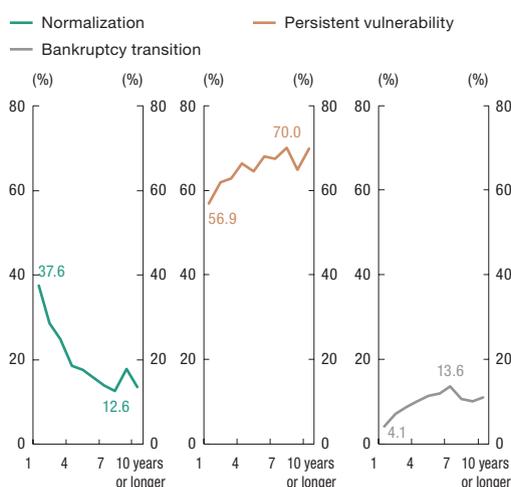
Note: 1) 2010~19 basis.
Sources: Bank of Korea's own estimation, KIS-Value.

As of 2020, it was estimated that 340 firms or 34.0% of all vulnerable firms (1,001) were long-term vulnerable firms that remained in a vulnerable state for more than four consecutive years. To understand how these long-term vulnerable firms continue to be in business despite their long-term vulnerability and to determine whether their financial conditions have been worsening, the trends of their key financial figures and ratios over the recent five years (2016-2020) were reviewed.
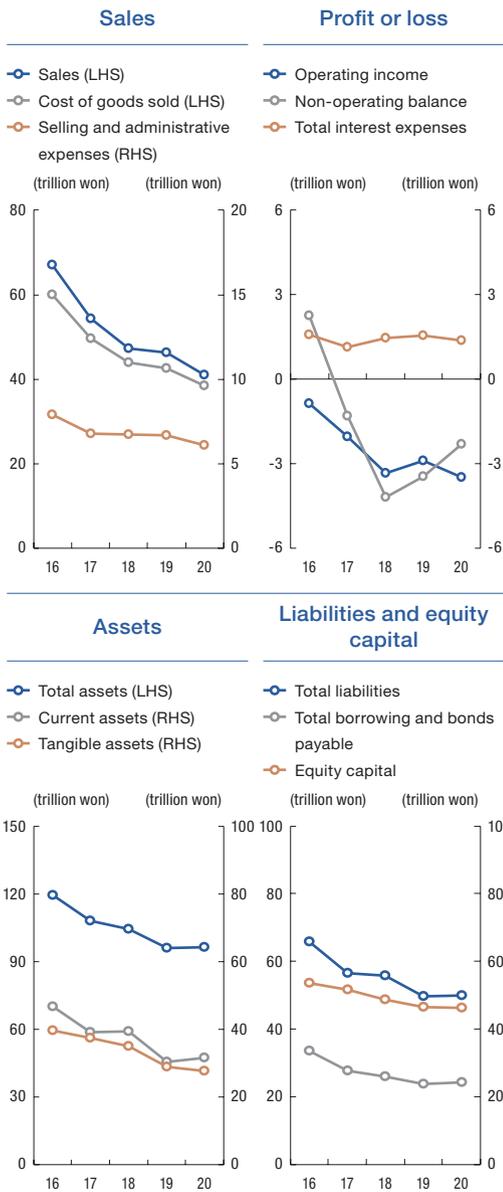
Long-term vulnerable firms in 2020 experienced a significant decrease in sales in 2017 (-18.9% from 2016), and despite responding by reducing operating expenses such as wages, their operating losses increased (-0.9 trillion won in 2016 → -2.0 trillion won in 2017)[5] and their non-operating balances turned to a loss (+2.3 trillion won → -1.3 trillion won). As a result, equity capital such as retained earnings decreased significantly (-3.5%), and both current assets such as cash held (-16.2%) and tangible assets such as real estate (-5.7%) decreased, resulting in a decrease in total assets (-9.3%). Meanwhile, even though their total borrowings and other liabilities were reduced,[6] the total interest expense remained almost unchanged, leading to an increase in average borrowing costs and a further drop in their interest coverage ratio. Long-term vulnerable firms appear to have since then undergone a repeated cycle of "sales drop → increase in operating losses → decrease in equity capital → decrease in assets → decrease in debt," which has resulted in a gradual contraction in their business operations (Figure Ⅳ-14).

5) Of the total firms classified as long-term vulnerable firms in 2020 (340 firms), those that transitioned from a normal firm in 2016 to a vulnerable firm in 2017 (58 firms) recorded an operating surplus in 2016, but experienced a huge dip in sales (-27.1%) in 2017, pushing them into red even though they had cut the cost of goods and selling and administrative expenses.

6) In the case of long-term vulnerable firms that transitioned from a normal firm to a vulnerable firm in 2017, they sharply increased their borrowings (+29.8%) during 2017 to cope with operating losses. However, starting in 2018, total amounts of borrowing declined also among these firms, showing a similar pattern in which assets and equity capital decrease at the same time.

Figure IV-14. Trends[3] of key financial figures[2] of long-term vulnerable firms[1] over the past five years

Sales

- Sales (LHS)
- Cost of goods sold (LHS)
- Selling and administrative expenses (RHS)

Profit or loss

- Operating income
- Non-operating balance
- Total interest expenses

(trillion won) (trillion won)   (trillion won) (trillion won)

Assets

- Total assets (LHS)
- Current assets (RHS)
- Tangible assets (RHS)

Liabilities and equity capital

- Total liabilities
- Total borrowing and bonds payable
- Equity capital

(trillion won) (trillion won)   (trillion won) (trillion won)

Notes: 1) Vulnerable firms with 4 years or longer of vulnerability as of 2020.
2) Sum of 2020 long-term vulnerable firms (340) basis.
3) Trends of long-term vulnerable firms over the past five years as of 2020.
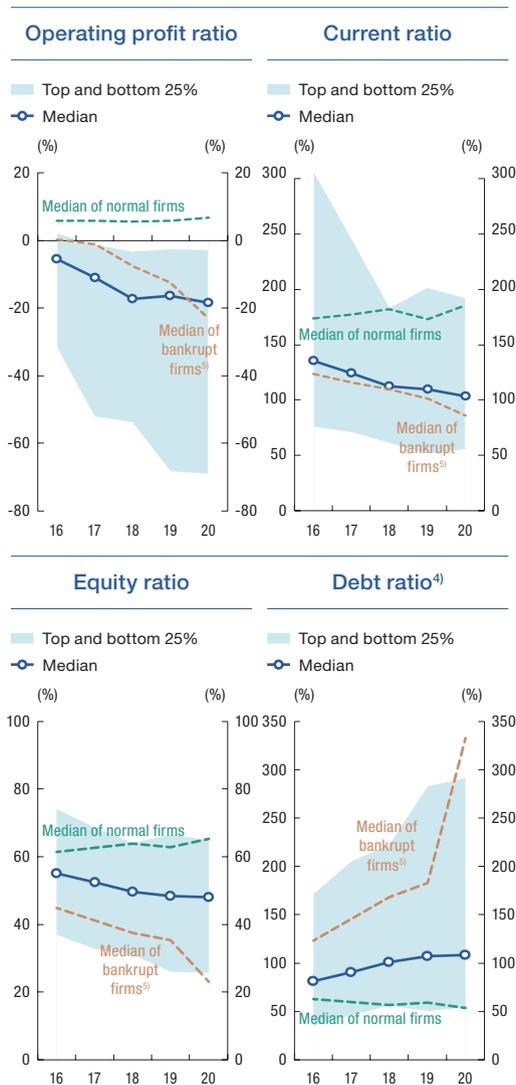Sources: Bank of Korea's own estimation, KIS-Value.

In 2016-2020, the operating losses of long-term vulnerable firms relative to their sales progressively increased (median operating loss-to-sales ratio: -5.6% in 2016 → -18.5% in 2020), causing a severe deterioration in their key financial ratios.[7][8] The current ratio, measuring the available short-term liquidity of a company to service current liabilities (median current ratio: 135.6% in 2016 → 103.2% in 2020), also declined sharply, and 48.5% of long-term vulnerable firms in 2020 had more current liabilities than current assets. Their equity-to-asset ratio, which evaluates long-term solvency through the proportion of capital that can be operated by a company without the burden of financial costs, also gradually decreased (median ratio: 55.1% → 48.0%). Meanwhile, as the decrease in capital outpaced the decrease in debt, the debt ratio ticked higher for most long-term vulnerable firms (median ratio: 81.5% → 108.3%). The number of firms whose debt ratio was in excess of 200% (including capital erosion) also jumped massively (71 in 2016 → 108 in 2020) (Figure IV-15).

7) The current ratio and equity-to-asset ratio are also key financial indicators considered in the assessment of corporate viability by the IMF (Global Financial Stability Report, April 2021) as a measure of liquidity and solvency, respectively.

8) During the same period, a radically opposite trend was observed among normal firms, whose operating income-to-sales ratio increased significantly (median ratio: 5.9% in 2016 → 6.8% in 2020). Their current ratio (median ratio: 173.8% in 2016 → 185.4% in 2020) and equity-to-asset ratio (median ratio: 61.4% in 2016 → 2 65.2% in 2020) also improved measurably, while their debt ratio (median ratio: 63.0% in 2016 → 53.4% in 2020) fell.

Figure IV-15. Trends[3] of key financial ratios[2] of long-term vulnerable firms[1]

Operating profit ratio

Top and bottom 25%
Median

Current ratio

Top and bottom 25%
Median

Equity ratio

Top and bottom 25%
Median

Debt ratio[4]

Top and bottom 25%
Median

Notes: 1) Vulnerable firms with 4 years or longer of vulnerability as of 2020.
2) Operating profit ratio = Operating income / sales (%)
Current ratio = Current asset / Current liabilities (%)
Debt ratio = Total debt / Equity capital (%)
Equity ratio= Equity capital / Total assets (%)
3) Trends of long-term vulnerable firms over the past five years ('16-'20) as of 2020.
4) Calculate quartile values by including capital erosion firms in the distributions.
5) Trends in the previous 5 years just before bankruptcy of a firm that occurs between 2016-2020.
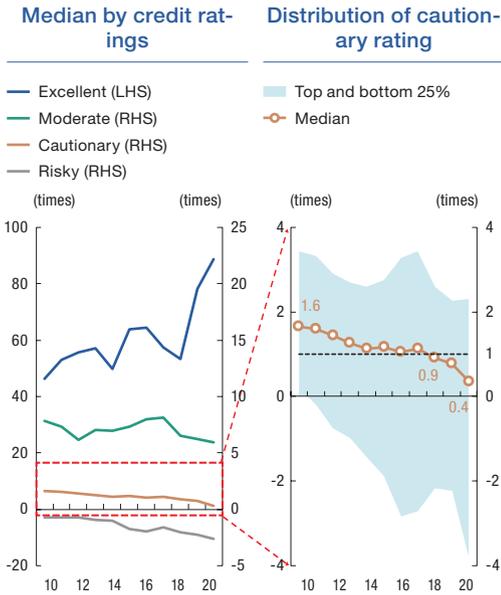Sources: Bank of Korea's own estimation, KIS-Value.

C. Reduced weight on interest coverage ratio in corporate credit ratings

Financial institutions and credit rating agencies evaluate companies using a variety of financial indicators and information, and it seems that the degree of reflection of interest coverage ratios in recent corporate credit ratings has been somewhat lowered. Looking at the trend of interest coverage ratios by credit rating, it was found that the median interest coverage ratio gradually decreased in all credit ratings[9] except for "excellent grade" since the global financial crisis. In particular, in the case of companies rated "cautionary" (KIS credit ratings 6-7) that fall on the boundary between investment grade and speculative grade, their median interest coverage ratio has continuously dropped since 2010, with the interest coverage ratio of over 50% of cautionary-rated firms standing below 1 from 2018 (Figure Ⅳ-16).

9) Based on the KIS credit ratings, the credit ratings of target companies were reclassified into four rating groups and analyzed in this article. The KIS rating scale is compared with the S&P and Moody's scales in the table below:
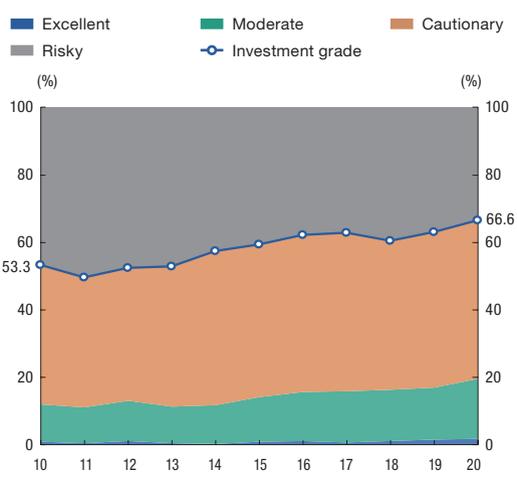
KIS	1	2	3	4	5	6	7	8	9	10
S&P	AAA	AA		A		BBB		B-CCC	C	D
Moody's	Aaa	Aa		A		Baa		Ba-Caa	Ca	C
This article		Excellent		Moderate		Cautionary			Risky	

Figure IV-16. Interest coverage ratios by credit ratings[1]

Median by credit ratings / Distribution of cautionary rating

Sources: Bank of Korea's own estimation, KIS-Value.

Figure IV-17. Distribution[2] of vulnerable firms' credit ratings[1]

Notes: 1) Based on the KIS credit ratings, the credit ratings of target companies were reclassified into excellent (1-3), moderate (4-5), cautionary (6-7), and risky (8-10); excellent, moderate, and cautionary ratings are classified as investment grade.
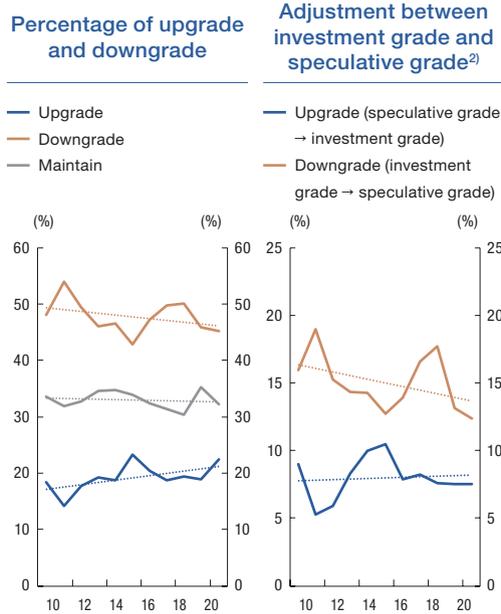2) Proportions of vulnerable firms by credit ratings per year.
Sources: Bank of Korea's own estimation, KIS-Value.

Meanwhile, the credit rating distribution of vulnerable firms showed that the proportion of vulnerable firms rated investment grade[10] has progressively increased since the global financial crisis to reach 66.6% in 2020 (Figure IV-17).

Regarding trends in the adjustment of credit ratings of vulnerable firms since 2010, the proportion of vulnerable firms whose credit ratings were upgraded from the previous year's ratings has been generally on the rise, while the proportion of those whose ratings were downgraded has been on a decline. In particular, the proportion of vulnerable firms that were downgraded from investment grade to speculative grade has decreased significantly since 2018, suggesting that the credit ratings of vulnerable firms are being downgraded more conservatively (Figure IV-18).

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10) Following the practice among major credit rating agencies of classifying BBB and above as investment grade, in this article, companies with a KIS rating of 1-7 were classified as investment grade and those with a KIS rating of 8-10 were classified as speculative grade.

Figure IV-18. Proportions in the adjustment[1] of credit ratings of vulnerable firms

Percentage of upgrade and downgrade

- Upgrade
- Downgrade
- Maintain

Adjustment between investment grade and speculative grade[2]

- Upgrade (speculative grade → investment grade)
- Downgrade (investment grade → speculative grade)

Notes: 1) KIS credit ratings are upgraded or downgraded relative to previous year.
2) KIS credit ratings classify 1-7 as investment grade and 8-10 as speculative grade.

Sources: Bank of Korea's own estimation, KIS-Value.

Figure IV-19. Average loan amount[1] per firms of normal and vulnerable firms

- Normal firms
- Vulnerable firms with operating losses
- Vulnerable firms with underperforming operations
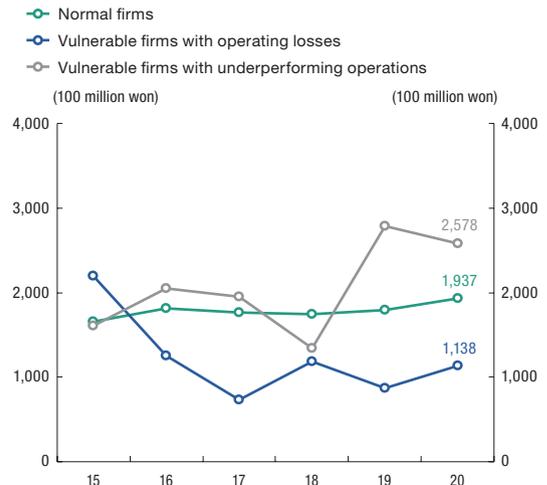
Note: 1) A simple average basis of annual total loans divided by the number of firms.

Sources: Bank of Korea's own estimation, KIS-Value, Korea Credit Information Services.

Due to the recent leniency in borrowing conditions and credit ratings, the average loans to vulnerable firms have increased significantly in recent years. It is presumed that vulnerable firms were able to lower their default risk through increased borrowing despite deterioration in profitability (Figure IV-19).

4. Assessment and Implications

Since the global financial crisis, in spite of the overall financial easing, the proportion of vulnerable firms with a low interest coverage ratio has risen due to deteriorating corporate profitability. After the onset of the COVID-19 pandemic, the borrowing conditions of companies were eased thanks to interest rate cuts and deferment of principal and interest repayment. However, as operating income relative to total assets declined significantly, the number of vulnerable firms with an interest coverage ratio below 1 rose sharply. These vulnerable firms tend to remain vulnerable for a considerable time because their interest coverage ratios do not improve quickly. In the case of long-term vulnerable firms with a duration of vulnerability of more than four

years, their operating losses appear to increase over time, causing both their short-term liquidity and long-term solvency to deteriorate, which in turn leads to a gradual contraction of corporate activities, such as a decline in their assets and equity capital (shrinking balance sheets).

These findings suggest that, in order to strengthen the debt servicing ability of the corporate sector and reduce the number of vulnerable firms, a more fundamental and urgent task would be improving their sales and operating income by promoting the recovery of domestic and global demand and strengthening their competitiveness, rather than financial support to reduce their interest expenses. Financial support for companies has a positive aspect of supporting the recovery of temporarily insolvent firms. However, it can also allow chronically insolvent firms to continue operating without restructuring, ultimately hurting the efficiency of resource distribution. Therefore, temporary financial relief measures that were implemented last year to minimize the negative impact of the COVID-19 pandemic must be gradually phased out in an orderly manner by taking into consideration the pace of economic recovery and the level of financial imbalances. In addition, in order to improve the efficiency of corporate support policies, it may also be necessary to establish a more sophisticated evaluation system for the debt repayment capacity and viability of firms.

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