



**BOJ**  
*Reports & Research Papers*

# Financial System FSR report



BANK OF JAPAN  
APRIL 2022

The total of major banks, regional banks, and *shinkin* banks covered in this *Report* is as follows (as at end-March 2022).

Major banks comprise the following 10 banks: Mizuho Bank, MUFG Bank, Sumitomo Mitsui Banking Corporation, Resona Bank, Saitama Resona Bank, Mitsubishi UFJ Trust and Banking Corporation, Mizuho Trust and Banking Company, Sumitomo Mitsui Trust Bank, Shinsei Bank, and Aozora Bank. Regional banks comprise the 62 member banks of the Regional Banks Association of Japan (Regional banks I) and the 37 member banks of the Second Association of Regional Banks (Regional banks II). *Shinkin* banks are the 247 *shinkin* banks that hold current accounts at the Bank of Japan.

This *Report* basically uses data available as at end-March 2022.

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## **Objectives of the *Financial System Report***

The Bank of Japan's semiannual *Financial System Report* has two main objectives: to assess the stability of Japan's financial system and to communicate to all related parties the future tasks and challenges in order to ensure the system's stability.

The *Report* first summarizes the current situation of financial markets and financial intermediation activities of Japanese financial institutions, then provides a regular assessment of the financial cycle and the resilience of financial institutions to stress, and lastly analyzes the vulnerabilities of the financial system from a macroprudential perspective. It also outlines issues that deserve attention and challenges to be addressed.

The Bank uses the results of the analysis set out in the *Report* in planning policies to ensure the stability of the financial system and for providing guidance and advice to financial institutions through on-site examinations and off-site monitoring. Moreover, the Bank makes use of the results in international discussions on regulation, supervision, and vulnerability assessment. In relation to the conduct of monetary policy, the macro assessment of financial system stability is also regarded as important input for the Bank in assessing risks in economic and price developments from a medium- to long-term perspective.

## **Motivations behind the April 2022 issue of the *Report***

The April 2022 *Report* provides a detailed analysis of the risks currently faced by Japanese financial institutions from the following three perspectives: (1) the impact of stress in the real economy brought about by the spread of COVID-19 on credit risk; (2) the risk of global economic and financial shocks, such as an adjustment in global financial markets, affecting financial institutions' overseas lending, securities investment, and foreign currency funding; and (3) developments in vulnerabilities that have been present since before the pandemic.

In the macro stress testing, the resilience of Japan's financial institutions and financial system is examined under two downside scenarios that reflect risks revealed from the analysis on the real economy and on the financial markets.

**Contents**

- Chapter I. Executive summary: Assessment of the stability of Japan's financial system and discussion of future challenges** 1
- Chapter II. Risks observed in financial and capital markets** 3
  - A. Global financial markets
  - B. Japanese financial markets
- Chapter III. Examination of financial intermediation** 12
  - A. Financial intermediation by financial institutions
  - B. Financial intermediation by non-bank financial intermediaries
  - C. Financial cycle and vulnerability
- Chapter IV. Risks faced by financial institutions** 29
  - A. Domestic credit risk
  - B. Overseas credit risk
  - C. Market risk associated with securities investment
  - D. Foreign currency funding risk
  - E. Risks resulting from vulnerabilities that have been present since before the pandemic
  - F. Risks posed by structural changes in the business environment
- Chapter V. Examination of the resilience of the financial system** 70
  - A. Financial institutions' profitability and capital adequacy
  - B. Macro stress testing
- Box 1: Risks related to the real estate market in the wake of the pandemic 89
- Box 2: Risk of outflows of overseas funds in the real estate market
- Box 3: U.S. interest rate increases and Japanese banks' deposit-lending margins in overseas lending
- Box 4: Foreign currency funding during a deterioration in financial conditions
- Box 5: Impact of the situation in Ukraine on Japan's financial system

## Glossary

### *Financial statements of financial institutions*

Net income = operating profits from core business + realized gains/losses on stockholdings + realized gains/losses on bondholdings – credit costs ± others (such as extraordinary gains/losses)

Gross operating profits from core business = core gross operating profits = net interest income + net non-interest income

Operating profits from core business = pre-provision net revenue (PPNR) excluding trading income = net interest income + net non-interest income – general and administrative expenses

Net interest income = interest income – interest expenses

Net non-interest income = net fees and commissions + profits on specified transactions + other operating profits – realized gains/losses on bondholdings

Overall gains/losses on stockholdings = realized gains/losses on stockholdings + changes in unrealized gains/losses on stockholdings

Realized gains/losses on stockholdings = gains on sales of stocks – losses on sales of stocks – losses on devaluation of stocks

Overall gains/losses on bondholdings = realized gains/losses on bondholdings + changes in unrealized gains/losses on bondholdings

Realized gains/losses on bondholdings = gains on sales of bonds + gains on redemption of bonds – losses on sales of bonds – losses on redemption of bonds – losses on devaluation of bonds

Credit costs = loan-loss provisions + write-offs + losses on credit sales – recoveries of write-offs

Credit cost ratio = credit costs / total loans outstanding

### *Capital adequacy ratios of internationally active banks*

Common equity Tier 1 (CET1) capital ratio = CET1 capital / risk-weighted assets

CET1 capital includes common equities and retained earnings.

Tier 1 capital ratio = Tier 1 capital / risk-weighted assets

Tier 1 capital includes CET1 capital and preferred equities that meet certain conditions.

Total capital adequacy ratio = Total capital / risk-weighted assets

Total capital includes Tier 1 capital and subordinated bonds that meet certain conditions.

### *Capital adequacy ratios of domestic banks*

Core capital ratio = core capital / risk-weighted assets

Core capital includes common equities and retained earnings as well as preferred equities that meet certain conditions.

## **I. Executive summary: Assessment of the stability of Japan's financial system and discussion of future challenges**

### *Current assessment of the stability of Japan's financial system*

Japan's financial system has been maintaining stability on the whole, while COVID-19 continues to affect economic and financial activity at home and abroad.

The Japanese government and the Bank of Japan have been implementing large-scale fiscal and monetary policy measures and taking flexible regulatory and supervisory actions, with the aim to support economic activity and maintain the functioning of financial markets. Profits of firms that have been significantly affected by the pandemic are weak. However, underpinned by the financial soundness of financial institutions on the whole, the policy responses have been effective and the financial intermediation function is being fulfilled smoothly. Financial markets have been nervous, reflecting concerns about a reduction in the degree of monetary easing in the United States and Europe as well as the situation in Ukraine.

### *Future risks and caveats*

According to the results of the macro stress testing, Japan's financial system is likely to remain highly robust even in the case of a resurgence of COVID-19 and a simultaneous rise in U.S. long-term interest rates leading to an adjustment in the real economy and global financial markets. However, in the event of a substantial and rapid adjustment in global financial markets, a deterioration in financial institutions' financial soundness and the resultant impairment of the smooth functioning of financial intermediation could pose a risk of further downward pressure on the real economy. In this regard, there are three risks that warrant attention.

It is notable that the impact of the situation in Ukraine on Japan's financial system is likely to be limited at this point. However, there is high uncertainty over future developments, and attention should be paid to the possibility that the impact on the financial system will become larger, possibly through an adjustment in global financial markets such as the ones described below.

The first risk is the impact of the pandemic on credit costs of domestic loans. Based on the results of a simulation of firms' financial conditions and financial institutions' credit cost ratio, deterioration in firms' financial conditions and rises in credit costs of domestic loans are likely to be contained on the premise that the economy continues to follow a recovery trend, as firms on the whole have maintained their financial soundness since before the pandemic and various measures to support corporate financing have been highly effective. However, as the impact of the pandemic varies across firms and industries, if there is a delay in the recovery, there is a risk of an adverse impact, particularly on loans to firms that have been significantly affected by the pandemic.

The second is the risk that future global economic and financial shocks, such as an adjustment in global financial markets, will have an adverse impact on Japanese financial institutions' overseas lending, securities investment, and foreign currency funding.

Although credit risk of overseas loans as a whole has been contained, if global economic and financial conditions deteriorate, default rates may rise, particularly among borrowers with low ratings. Moreover, attention needs to be paid to energy-related exposure where the impact of global efforts toward achieving a carbon-neutral economy could strengthen, and to exposure related to air transportation where there is significant uncertainty over the industry's future demand.

Regarding securities investment, with the increasing importance of non-bank financial intermediaries (NBFIs) such as investment funds in global financial intermediation activities, there has been a growing overlap in the securities portfolios of Japanese financial institutions and investment funds, measured by the correlation of market values of the portfolios. As a result, there seems to be a growing possibility that the market risk that Japanese financial institutions face at times of stress is amplified by the activities of NBFIs.

In terms of foreign currency funding, if there is widespread deterioration in financial conditions such as at the time of the market turmoil in March 2020, Japanese banks may face significant stress, possibly accompanied by the widening loan-to-deposit gap. With funding conditions changing, as seen in U.S. interest rate increases in particular, it is necessary to continue to pay attention to financing management while strengthening the foreign currency funding basis.

The third is risks associated with vulnerabilities that have been present since before the pandemic. In recent years, amid the low interest rate environment and structural factors putting downward pressure on profitability, Japanese financial institutions have been active in risk-taking mainly with regard to lending with high leverage, such as lending to domestic middle-risk firms, lending to the real estate industry, and lending related to large-scale M&A deals. Such a picture is unchanged at present, while the overall credit risk has been low.

From a longer-term perspective, attention should be paid to the risk that the low interest rate environment and structural factors continue to exert downward pressure on financial institutions' profits for a prolonged period, leading to a gradual pullback in financial intermediation, or on the contrary, to the possibility that the vulnerability of the financial system increases, mainly as a result of financial institutions' search for yield behavior.

### *Challenges for financial institutions*

Amid uncertainties over domestic and overseas economies such as future developments in the spread of COVID-19 and geopolitical risks, the major challenge for financial institutions is to smoothly fulfill their financial intermediation function by balancing their financial soundness and risk taking. In this regard, (1) strengthened management of the three risks mentioned above, (2) offering support based on the sustainability of borrowers' businesses, and (3) sound capital planning under considerable uncertainty are the keys to maintaining their financial soundness.

In Japan, the environment surrounding its economy and society is undergoing major changes, e.g., digital transformation and climate change, amid the decline in and aging of the population. Against this background, financial institutions are expected to improve their services to achieve a sustainable society while maintaining their soundness, from the perspective of contributing to increasing productivity in Japan.

The Bank of Japan, in close cooperation with the Japanese government and overseas financial authorities, will make efforts to ensure the stability of the financial system and the smooth functioning of financial intermediation. From a medium- to long-term perspective, the Bank will actively support financial institutions' initiatives by taking measures to respond to climate-related financial risks and by facilitating digital transformation.

## II. Risks observed in financial and capital markets

- This chapter summarizes the developments in financial markets within Japan and abroad, mainly during the second half of fiscal 2021, and examines the risks associated with market developments.<sup>1</sup>
- In global financial markets, there have been large fluctuations due to uncertainties over the Omicron variant, moves to reduce the degree of monetary easing in the United States and Europe, and the heightened tension in Ukraine, amid continuing favorable corporate results. U.S. and European stock prices temporarily recorded historical highs, but the markets have been nervous, seeing significant declines since then, mainly reflecting moves to reduce the degree of monetary easing in the United States and Europe and the heightened tension in Ukraine. The credit spreads of corporate bonds have widened. In emerging markets, stock prices and currencies have declined and credit spreads of government bonds have widened. Meanwhile, U.S. long-term interest rates temporarily declined amid the outbreak of the Omicron variant, but they have risen somewhat significantly since then, reflecting moves by the Federal Reserve (FRB) to reduce the degree of monetary easing.
- In Japanese financial markets, with the Bank of Japan continuing Quantitative and Qualitative Monetary Easing (QQE) with Yield Curve Control, both short- and long-term interest rates were generally stable, although long-term rates fluctuated temporarily due to factors including those overseas. Japanese stock prices have declined, reflecting the FRB's moves to reduce the degree of monetary easing and the heightened tension in Ukraine among other factors, in a situation of continued concern over developments with the Omicron variant. The yen has depreciated against the U.S. dollar, mainly on the back of a widening of the yield differential between Japan and the United States.
- Uncertainty about global financial markets remains high. There is a risk that U.S. long-term interest rates will rise suddenly, depending, for example, on developments in U.S. inflation rates if attention is paid to factors such as an early reduction in the degree of monetary easing by the FRB. Attention should be paid to the possibility that asset prices, including those of stocks and credit products, could correct in the event of such a sudden rise in U.S. long-term interest rates, as well as depending on developments in geopolitical risks and the spread of COVID-19.

### A. Global financial markets

#### *U.S. and European long-term interest rates*

U.S. long-term interest rates declined temporarily in autumn 2021 due to safe-haven flows brought about by the outbreak of the Omicron variant. They have risen somewhat significantly since then, reflecting the FRB's moves to reduce the degree of monetary easing amid growing concerns over inflation (Chart II-1-1). Against this background, federal funds futures curves have risen and the yield curve for U.S. Treasuries has flattened, mainly due to rises in yields in the short- to medium-term zone (Charts II-1-2 and II-1-3). The volatility of U.S. Treasury bond futures has increased (Chart II-1-4). European long-term interest rates have also risen somewhat significantly in tandem

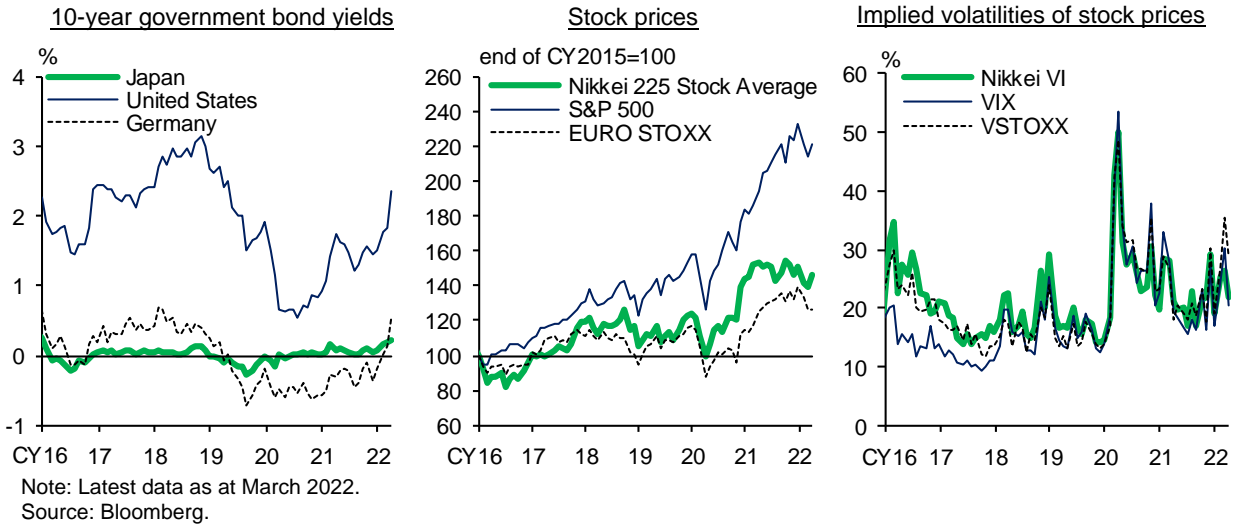
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<sup>1</sup> In Japan, the fiscal year starts in April and ends in March of the following year.

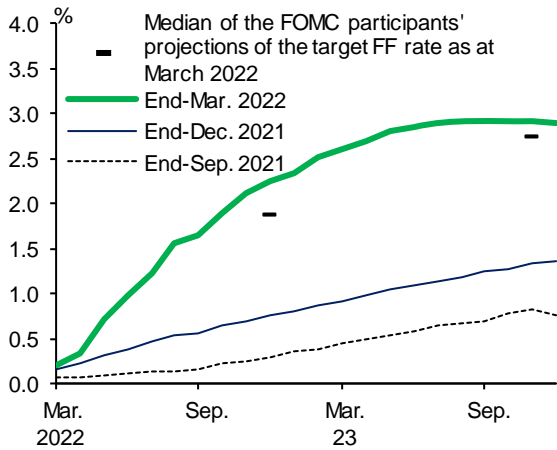


with U.S. long-term interest rates, mainly reflecting moves to reduce the degree of monetary easing in Europe (Chart II-1-5).

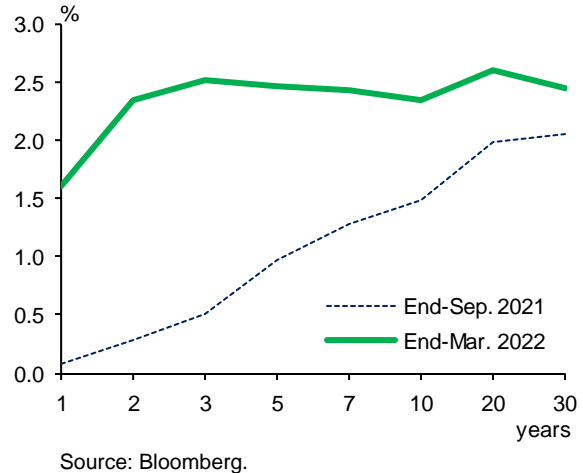
**Chart II-1-1: Developments in global financial markets**



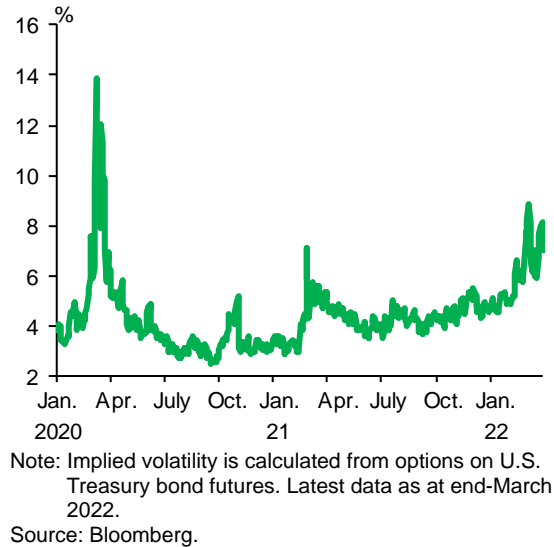
**Chart II-1-2: Federal funds futures curves**



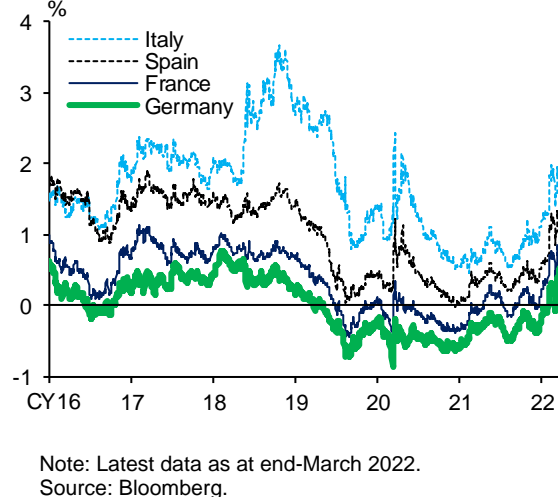
**Chart II-1-3: U.S. Treasury yield curves**



**Chart II-1-4: Implied volatility of U.S. Treasury bond futures**



**Chart II-1-5: 10-year European government bond yields**



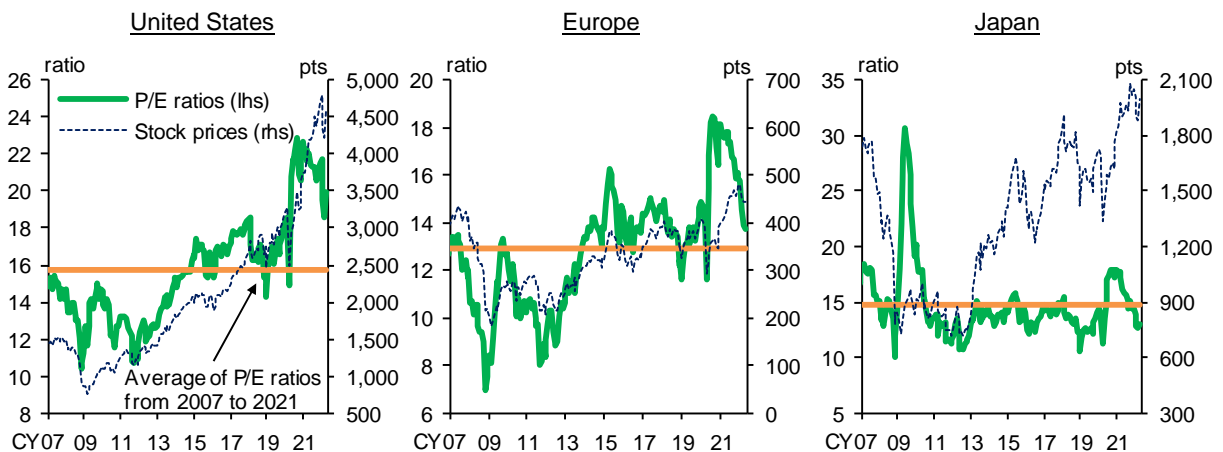
II. Risks observed in financial and capital markets  
A. Global financial markets

*U.S. and European stock prices*

U.S. and European stock prices declined temporarily in autumn 2021 amid the outbreak of the Omicron variant, followed by a rise in a wide range of sectors through the beginning of 2022 and ultimately recording historical highs, mainly on the back of favorable corporate results. However, the markets have been nervous, seeing significant declines since then, mainly reflecting moves to reduce the degree of monetary easing in the United States and Europe and the heightened tension in Ukraine (Charts II-1-1, II-1-6, and II-1-7). Meanwhile, inflows in equity funds have continued to follow an uptrend (Chart II-1-8).

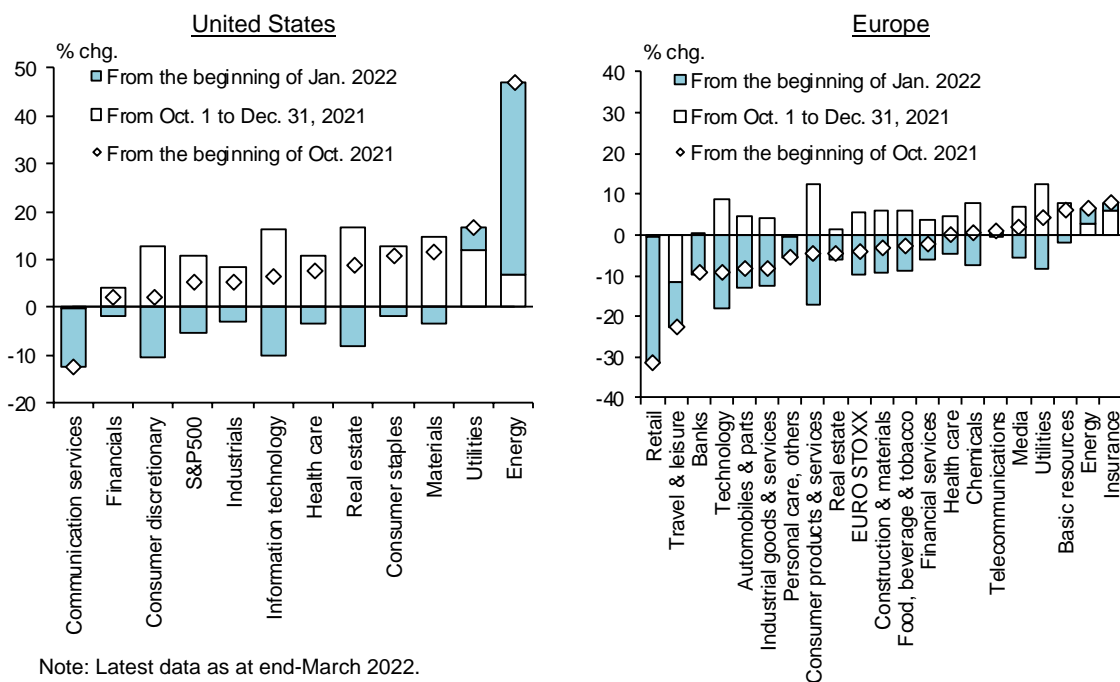
Expected earnings per share (EPS) for U.S. and European firms has been rising (Chart II-1-9). On the other hand, price-earnings (P/E) ratios have declined, due partly to the effects of the rises in interest rates (Chart II-1-6). Meanwhile, the volatility of stock prices has generally been at a level exceeding the 20 mark, a perceived milestone in the market, as stock prices have fluctuated significantly (Chart II-1-1).

**Chart II-1-6: Stock prices and valuation**



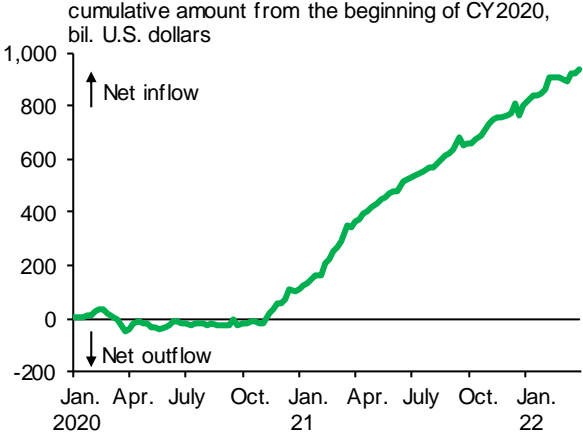
Note: 1. "Stock prices" indicates the S&P 500 for the United States, the EURO STOXX for Europe, and the TOPIX for Japan. "P/E ratios" is calculated using expected EPS for the next 12 months.  
2. Latest data as at March 2022.  
Source: Datastream from Refinitiv.

**Chart II-1-7: U.S. and European stock price performance by sector**



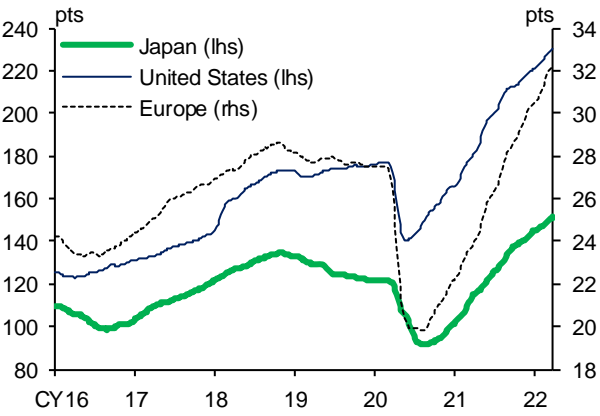
Note: Latest data as at end-March 2022.  
Source: Bloomberg.

**Chart II-1-8: Net flows in U.S. and European equity funds**



Note: Latest data as at March 30, 2022 (weekly data).  
Source: EPFR Global; Haver Analytics.

**Chart II-1-9: Expected EPS**

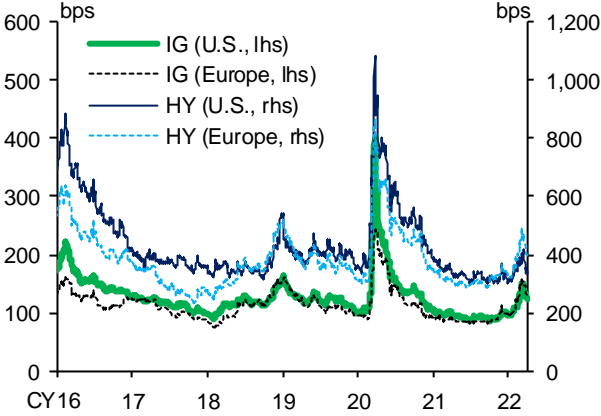


Note: 1. "Japan," "United States," and "Europe" indicate expected EPS for the next 12 months of the TOPIX, the S&P 500, and the EURO STOXX, respectively. 4-week backward moving averages.  
2. Latest data as at end-March 2022.  
Source: Datastream from Refinitiv.

*U.S. and European credit markets*

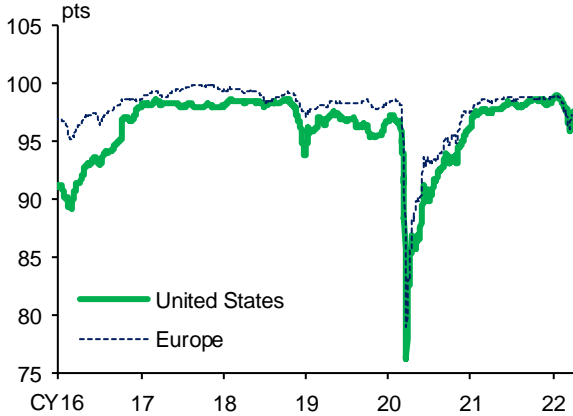
In U.S. and European credit markets, credit spreads have widened, mainly reflecting moves to reduce the degree of monetary easing in the United States and Europe and the heightened tension in Ukraine, while the prices of leveraged loans have declined somewhat (Charts II-1-10 and II-1-11).

**Chart II-1-10: Credit spreads on U.S. and European corporate bonds**



Note: 1. "IG" and "HY" indicate investment-grade corporate bonds and high-yield bonds, respectively.  
2. Latest data as at end-March 2022.  
Source: ICE Data Indices.

**Chart II-1-11: Leveraged loan prices**



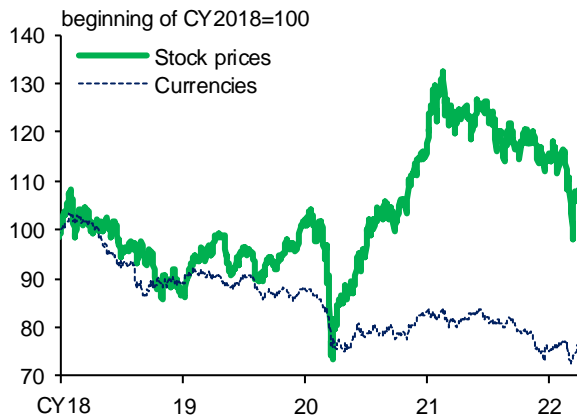
Note: 1. The figures indicate the index of leveraged loan prices in the secondary markets (the S&P/LSTA Leveraged Loan Index for the United States and the S&P European Leveraged Loan Index for Europe).  
2. Latest data as at end-March 2022.  
Source: Bloomberg.

II. Risks observed in financial and capital markets  
 A. Global financial markets

*Emerging markets*

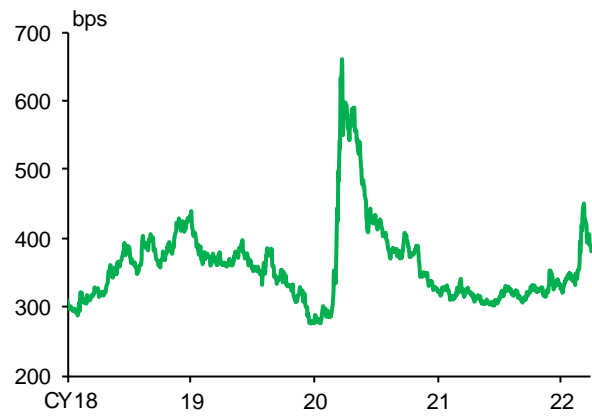
In emerging markets, stock prices and currencies have declined and credit spreads of government bonds have widened, mainly reflecting the FRB's moves to reduce the degree of monetary easing and the heightened tension in Ukraine (Charts II-1-12 and II-1-13). Meanwhile, equity fund inflows to emerging market economies have continued. On the other hand, outflows from bond funds have been observed in these economies, mainly owing to the rise in U.S. interest rates (Chart II-1-14).

**Chart II-1-12: Stock prices and currencies in emerging market economies**



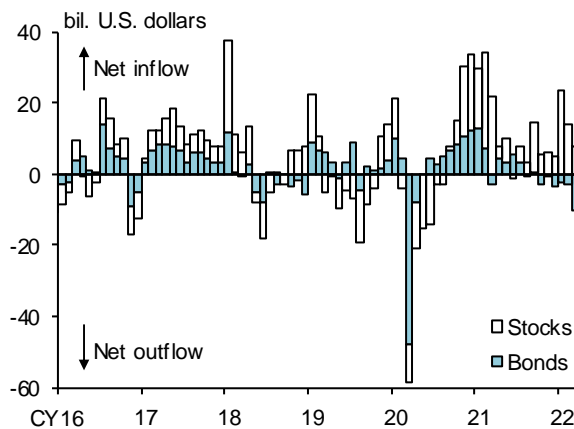
Note: 1. "Stock prices" indicates the MSCI EM Local Index.  
 "Currencies" indicates the J.P. Morgan EMCI Index.  
 2. Latest data as at end-March 2022.  
 Source: Bloomberg.

**Chart II-1-13: Credit spreads in emerging market economies**



Note: 1. Yield spreads of the EMBI Global over U.S. Treasuries.  
 2. Latest data as at March 30, 2022.  
 Source: Bloomberg.

**Chart II-1-14: Net flows in emerging market funds**



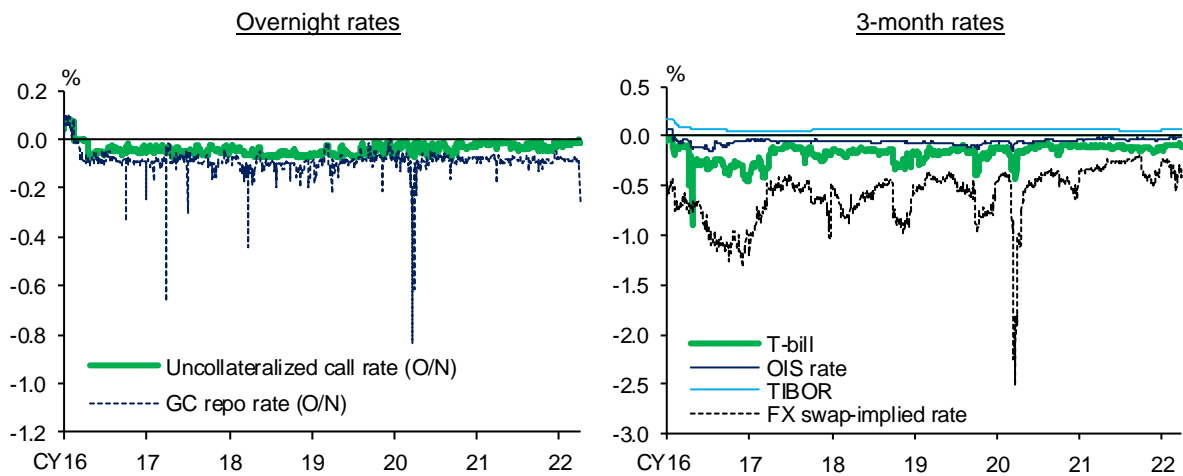
Note: Latest data as at March 2022.  
 Source: EPFR Global; Haver Analytics.

## B. Japanese financial markets

### Short- and long-term interest rates

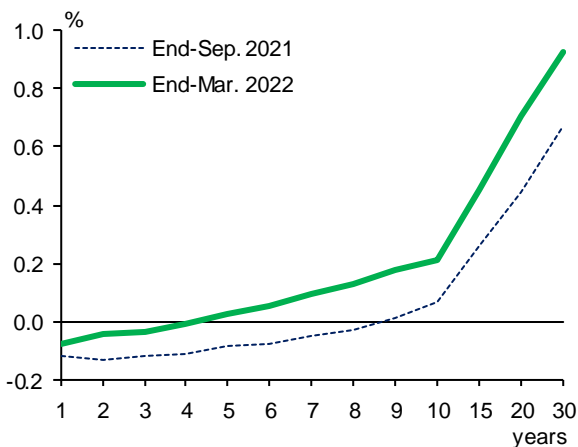
Short-term interest rates on both overnight and term instruments have been in negative territory on the whole (Chart II-2-1). Under QQE with Yield Curve Control, the slope of the yield curve for JGBs has been in line with the current guideline for market operations, in which the short-term policy interest rate is set at minus 0.1 percent and the target level of 10-year JGB yields is around 0 percent, although it has risen slightly, mainly in response to the rise in U.S. interest rates (Charts II-2-2 and II-2-3).

**Chart II-2-1: Short-term rates**



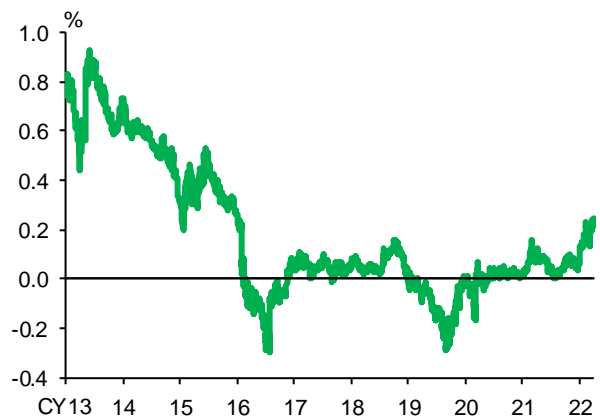
Note: 1. In the left-hand chart, the horizontal axis indicates the starting date of transaction settlement. Up to April 27, 2018, "GC repo rate (O/N)" indicates the T/N rate.  
 2. In the right-hand chart, "FX swap-implied rate" is estimated based on the U.S. dollar funding rate (the OIS rate before January 3, 2019, and the SOFR thereafter) and FX swaps (forward spread).  
 3. In both charts, the latest data are as at end-March 2022.  
 Source: Bloomberg; Japan Bond Trading; JSDA; BOJ.

**Chart II-2-2: JGB yield curves**



Source: Bloomberg.

**Chart II-2-3: 10-year JGB yields**

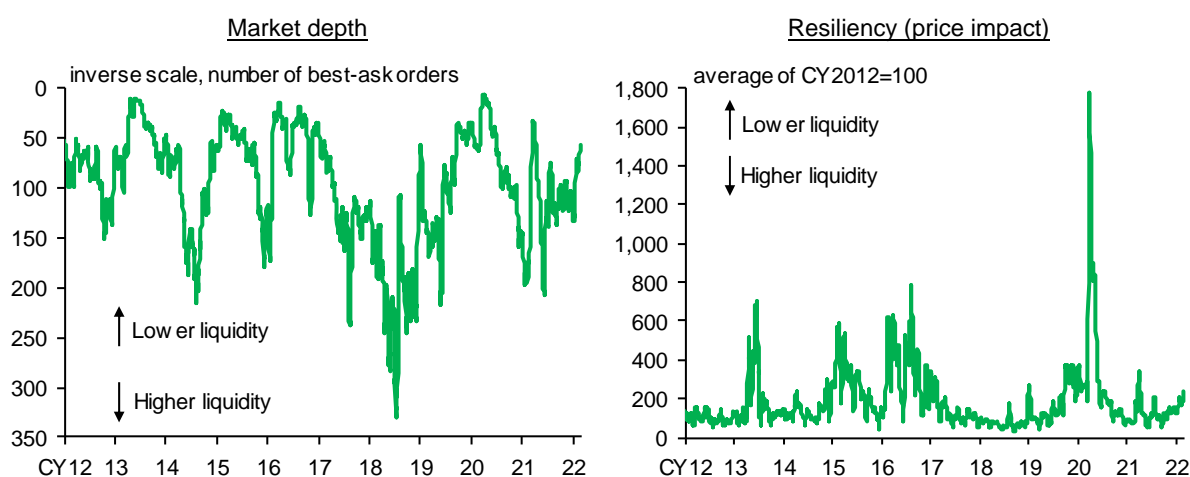


Note: Latest data as at end-March 2022.  
 Source: Bloomberg.

### Liquidity and functioning of JGB markets

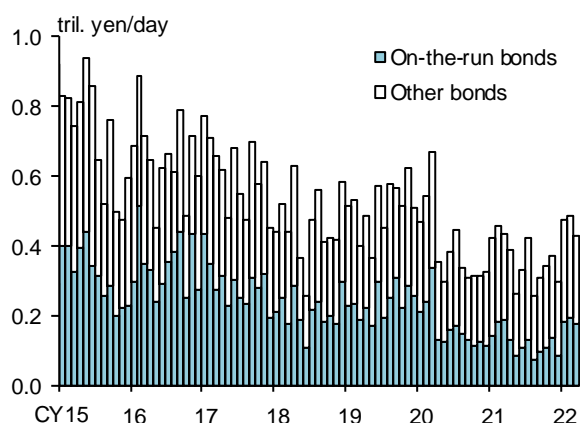
The liquidity and functioning of JGB markets have recovered from the state of significant deterioration observed around spring 2020. Liquidity indicators of market depth and resiliency have deteriorated slightly but remain at favorable levels compared with the deterioration phase around spring 2020 (Chart II-2-4).<sup>2</sup> Inter-dealer transaction volume for cash JGBs has been increasing recently, although it has remained at a low level on the whole (Chart II-2-5). Meanwhile, according to the latest *Bond Market Survey* (February 2022), the diffusion index for the degree of bond market functioning from the surveyed institutions' viewpoint has improved from the previous round of the survey conducted in November 2021, although it is still in deep negative territory (Chart II-2-6).

**Chart II-2-4: Market depth and resiliency in JGB futures markets**



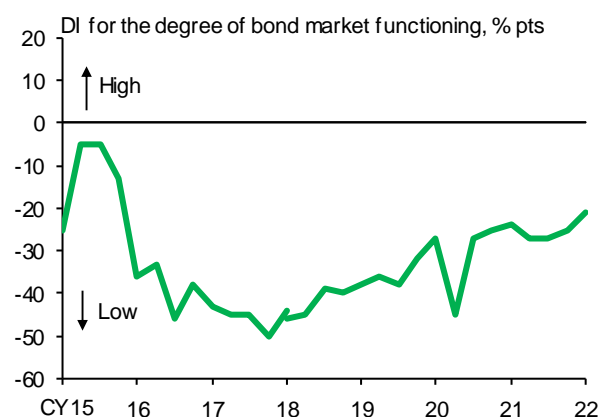
Note: 1. In the left-hand chart, the figures are the number of orders at the best-ask price with 1-minute frequency (median for each business day). In the right-hand chart, the figures indicate the price change per unit volume of transactions for each business day.  
 2. 10-day backward moving averages. Latest data as at end-February 2022.  
 Source: Nikkei Inc., "NEEDS."

**Chart II-2-5: Transaction volume in JGB markets**



Note: Inter-dealer transaction volume for cash JGBs (2-, 5-, 10-, 20-, 30-, and 40-year JGBs) via Japan Bond Trading. Latest data as at March 2022.  
 Source: Japan Bond Trading; QUICK.

**Chart II-2-6: Bond market survey**



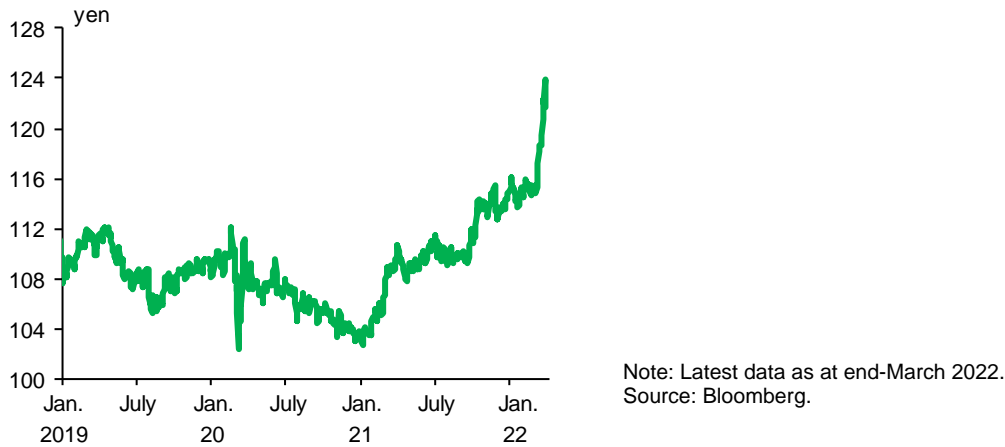
Note: 1. Based on the proportion of responding institutions selecting a given choice, the DI is calculated as follows: DI for the degree of current bond market functioning = "high" - "low."  
 2. The data from February 2018 onward cover major institutional investors. Latest data are based on the February 2022 survey.  
 Source: BOJ, "Bond market survey."

<sup>2</sup> For details, see the Bank of Japan's website (<https://www.boj.or.jp/en/paym/bond/index.htm/#p02>). The Financial Markets Department of the Bank generally updates and releases liquidity indicators of the JGB markets on a quarterly basis.

*FX markets and stock and credit markets*

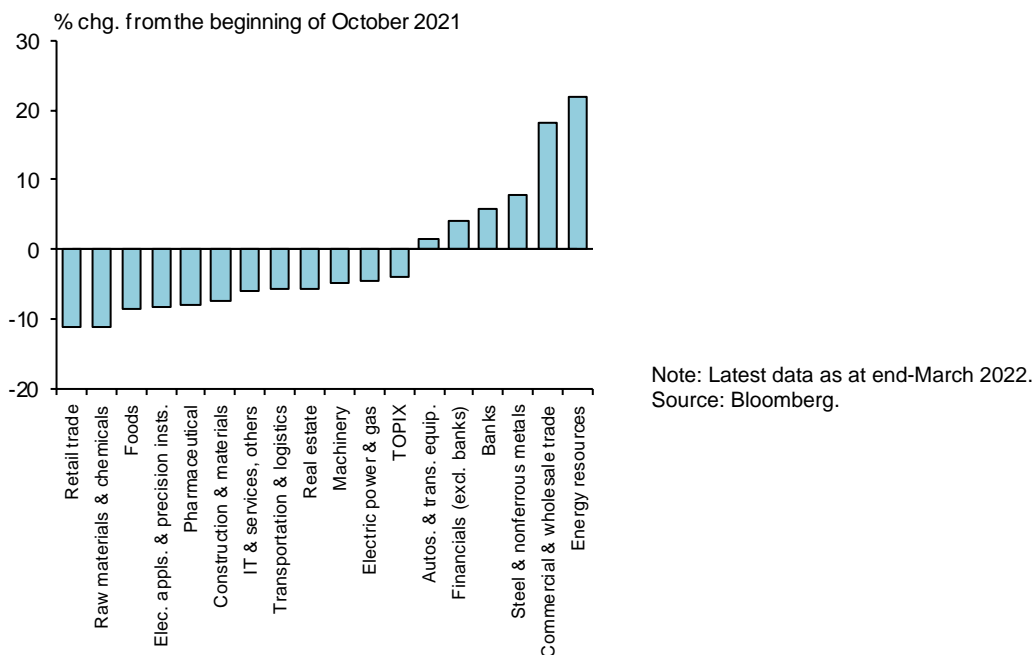
In FX markets, the yen has depreciated against the U.S. dollar, mainly on the back of a widening of the yield differential between Japan and the United States (Chart II-2-7).

**Chart II-2-7: U.S. dollar/yen rates**



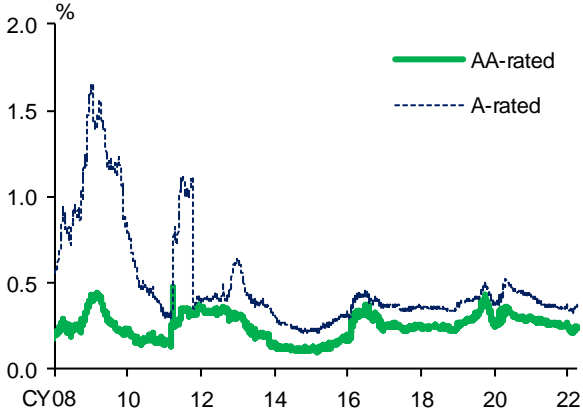
Japanese stock prices have declined, mainly reflecting the FRB's moves to reduce the degree of monetary easing and the heightened tension in Ukraine, in a situation of continued concern over developments with the Omicron variant (Charts II-1-1 and II-1-6). Stock prices have declined in a wide range of sectors, while those in "energy resources," "commercial and wholesale trade," and "steel and nonferrous metals," which benefit from a rise in commodity prices, have risen (Chart II-2-8). Meanwhile, the expected EPS for Japanese firms has been increasing (Chart II-1-9). Against this background, the P/E ratios for Japanese firms have been declining (Chart II-1-6). Credit spreads of corporate bonds and issuance rates for CP have been almost flat (Charts II-2-9 and II-2-10).

**Chart II-2-8: Japanese stock price performance by sector**



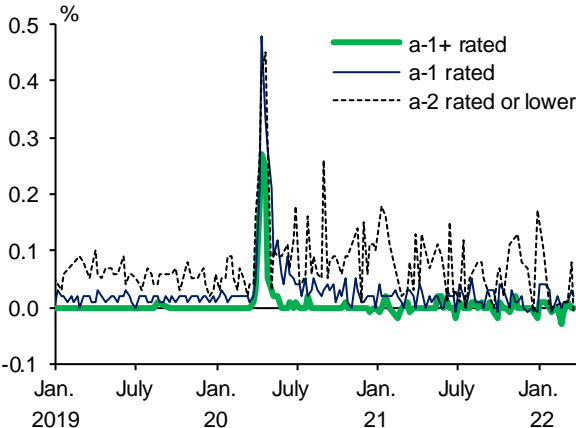
II. Risks observed in financial and capital markets  
 B. Japanese financial markets

**Chart II-2-9: Credit spreads on corporate bonds**



Note: 1. Yield spreads of corporate bonds with remaining maturity of 3 or more years but less than 7 years over government bonds. Rated by R&I.  
 2. Latest data as at end-March 2022.  
 Source: Bloomberg; JSDA; QUICK.

**Chart II-2-10: CP issuance rates**



Note: 1. Average rates of issuance for CP issued by business companies with remaining maturity of 3 months. In principle, rated by R&I.  
 2. Latest data as at March 25, 2022 (weekly data).  
 Source: JASDEC.



### III. Examination of financial intermediation

- This chapter examines developments in financial intermediation in Japan, mostly based on information that was available in the second half of fiscal 2021.

#### Financial intermediation by financial institutions

- Japanese financial institutions have actively fulfilled their financial intermediation function, and the outstanding amount of private financial institutions' domestic loans has greatly exceeded pre-pandemic levels. Under these circumstances, firms' precautionary demand for liquidity due to the pandemic has subsided on the whole.
- Overseas loans have picked up, particularly in the United States, due to the steady demand for M&A financing and the recovery trend in firms' demand for funds accompanying the resumption of economic activity.
- As for securities investment, major banks' holdings of yen-denominated bonds have been increasing of late, while their holdings of foreign bonds have decreased due to concerns about a rise in overseas interest rates. At regional financial institutions, the pace of increase in their holdings of investment trusts has decelerated through the end of the fiscal year amid the deterioration of market conditions. The outstanding amount of overseas credit products held by Japanese financial institutions has declined slightly of late.

#### Financial intermediation by non-bank financial intermediaries

- Life insurance companies have continued to invest in super-long-term JGBs. Pension funds have continued to invest in foreign securities while rebalancing their portfolios in response to rising stock prices, but the pace of increase has decelerated. Meanwhile, Japanese investment trusts have continued to see steady inflows of funds.

#### Financial cycle and vulnerability

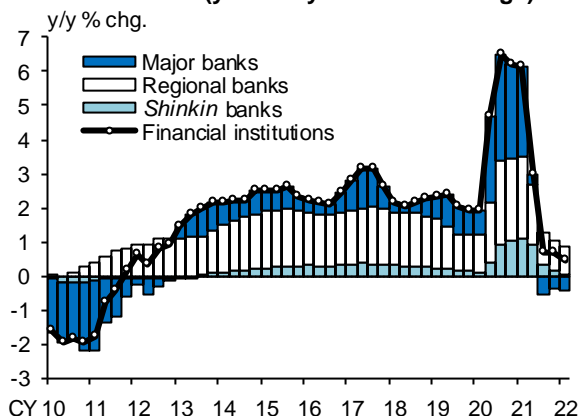
- In the current heat map, four out of the 14 Financial Activity Indexes (FAIXs) are "red," which signals a large upward deviation from the trend. However, the red FAIXs are the result of financial institutions responding to increased demand for working capital due to the pandemic and do not signal overheating of financial activities.

## A. Financial intermediation by financial institutions

### 1. Domestic loans

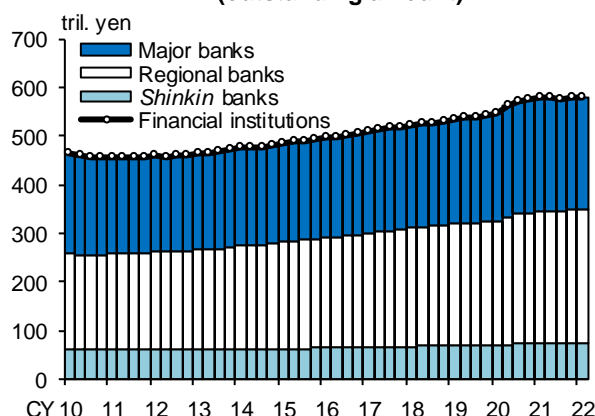
The outstanding amount of private financial institutions' domestic loans has greatly exceeded pre-pandemic levels. Its annual growth rate has been slightly positive since the second half of fiscal 2021 (Charts III-1-1 and III-1-2).

**Chart III-1-1: Domestic loans outstanding among financial institutions (year-on-year rate of change)**



Note: Latest data as at the January-March quarter of 2022.  
 Source: BOJ, "Principal figures of financial institutions."

**Chart III-1-2: Domestic loans outstanding among financial institutions (outstanding amount)**

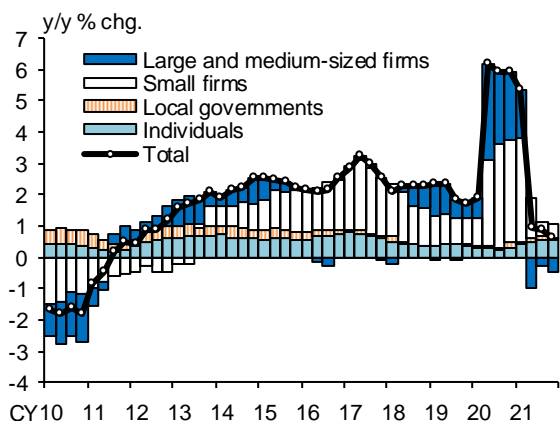


Note: Latest data as at the January-March quarter of 2022.  
 Source: BOJ, "Principal figures of financial institutions."

Firms' precautionary demand for liquidity due to the pandemic has subsided on the whole. By type of borrower, the annual rate of change in loans outstanding to large and medium-sized firms has been slightly negative as some firms have been repaying their cash reserves, while the growth rate for small firms, albeit still positive, has decelerated (Charts III-1-3 and III-1-4). The annual growth rate of loans outstanding to individuals has been slightly positive.

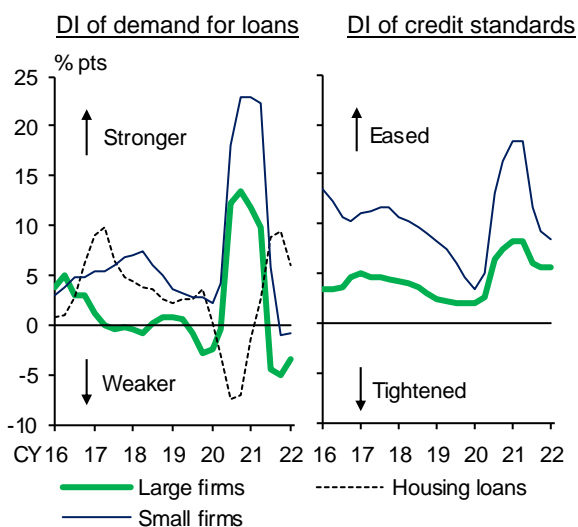
Meanwhile, the lending stance of financial institutions continues to be active (Chart III-1-4).

**Chart III-1-3: Loans outstanding among financial institutions by type of borrower**



Note: Loans to banks and insurance companies are excluded.  
 Latest data as at end-December 2021.  
 Source: BOJ.

**Chart III-1-4: Survey on bank lending practices at large Japanese banks**

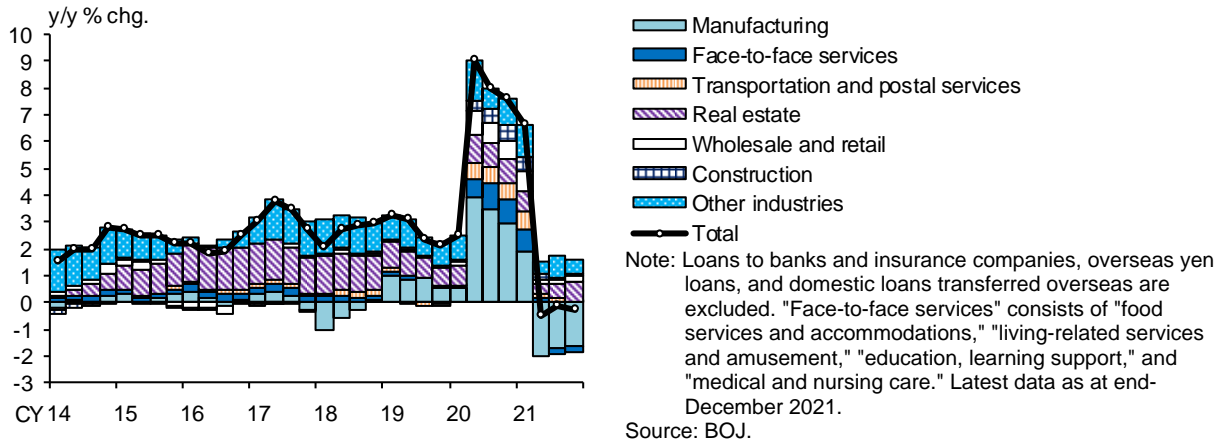


Note: 4-quarter backward moving averages. Latest data as at January 2022.  
 Source: BOJ, "Senior loan officer opinion survey on bank lending practices at large Japanese banks."

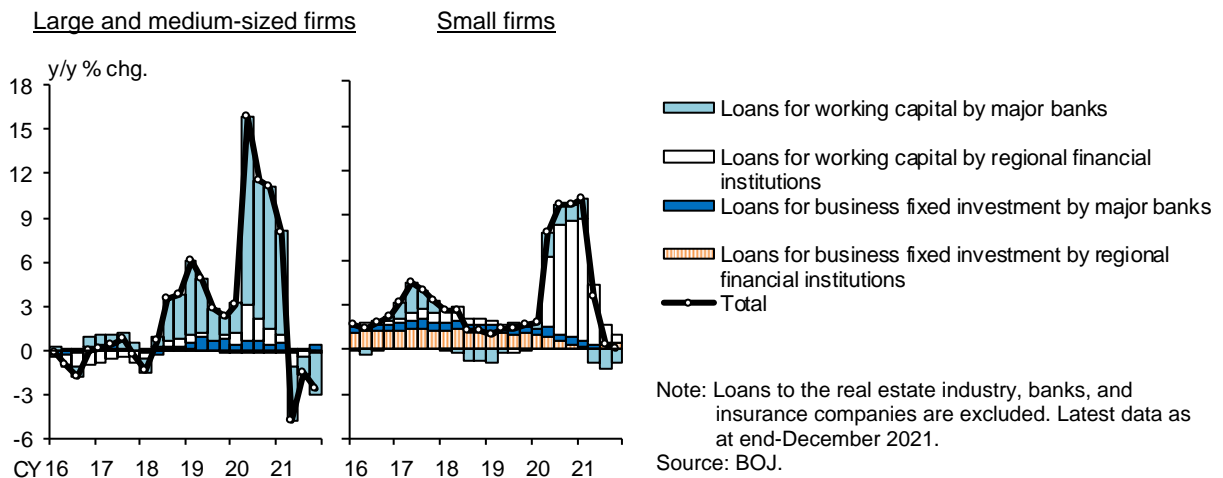
### Developments in loans by type of borrower

While the annual growth rate of loans to manufacturing firms has been negative, that to non-manufacturing firms -- particularly to the real estate industry -- has remained positive (Chart III-1-5). By type of loan, the annual growth rate of loans for working capital has been negative for large and medium-sized firms, while it has been more or less flat for small firms. The annual growth rate of loans for business fixed investment has picked up for large and medium-sized firms (Chart III-1-6).

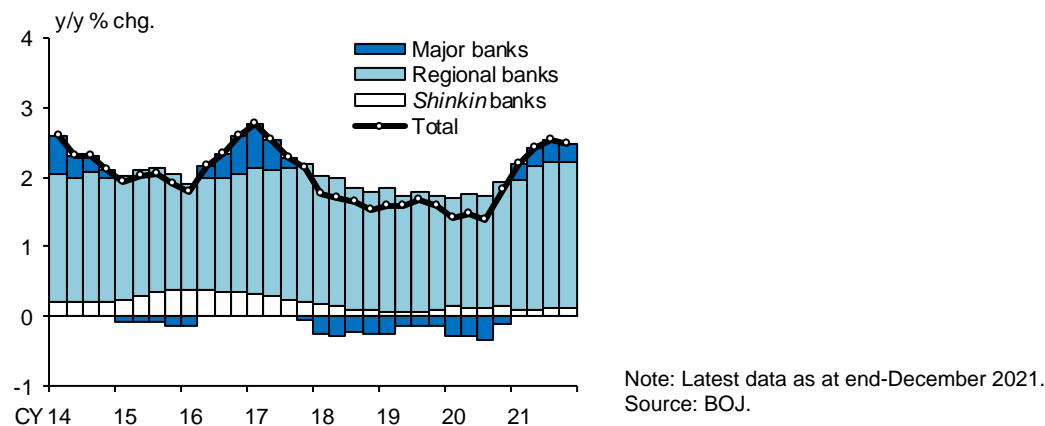
**Chart III-1-5: Banks' corporate loans outstanding by industry**



**Chart III-1-6: Corporate loans outstanding by size of firm and type of loan**



**Chart III-1-7: Outstanding amount of housing loans among financial institutions**



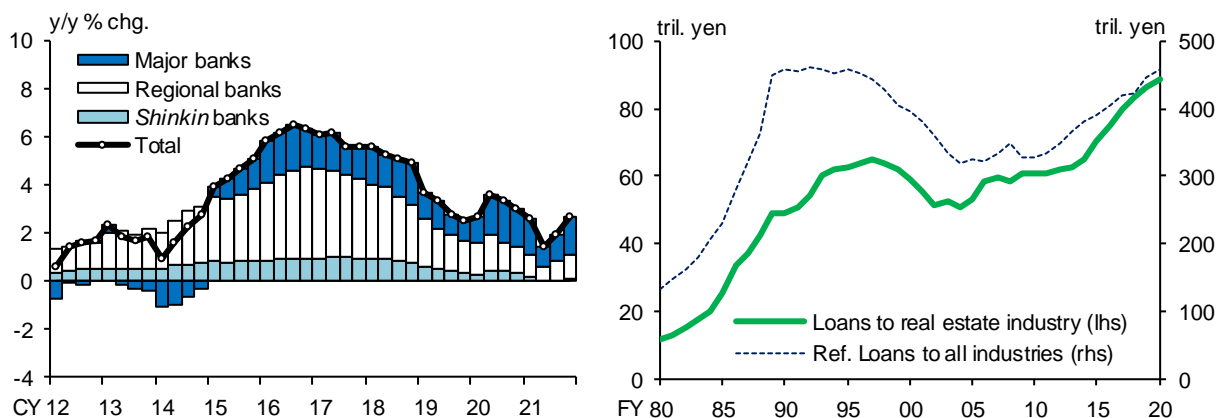
III. Examination of financial intermediation  
 A. Financial intermediation by financial institutions

With regard to loans to individuals, the annual growth rate of housing loans -- which account for a large share of loans to individuals -- has remained at a somewhat increased level as housing investment has picked up (Charts III-1-4 and III-1-7).

*Developments in real estate loans*

The outstanding amount of loans to the real estate industry has continued to grow (Chart III-1-8). That by domestically licensed banks, with about 91 trillion yen as of the end of December 2021, remained at a record high. Loans by major banks have continued to increase, particularly those to real estate investment trusts (REITs) and real estate investment funds. Loans by regional banks have seen a rise in growth, mainly in major metropolitan areas, as they have focused on loans to rental housing businesses on the back of a rise in needs for asset management, coupled with households' needs for asset formation.

**Chart III-1-8: Real estate loans among financial institutions**

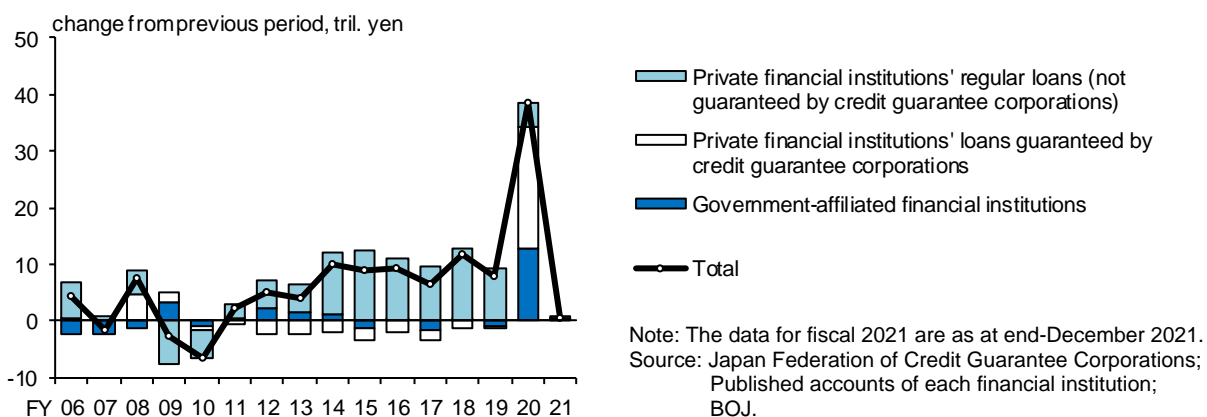


Note: 1. The right-hand chart covers domestically licensed banks only to extend the time scale.  
 2. In the left-hand chart, the latest data are as at end-December 2021. In the right-hand chart, the latest data are as at end-March 2021.  
 Source: BOJ.

*Developments in public financing support*

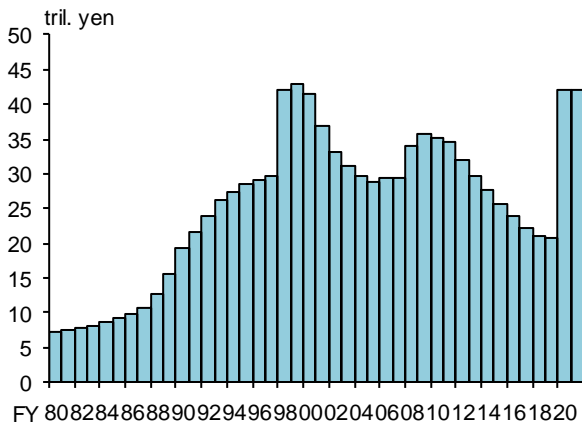
Public financing support -- defined as the sum of loans by private financial institutions guaranteed

**Chart III-1-9: Corporate loans outstanding by government-affiliated and private financial institutions**



Note: The data for fiscal 2021 are as at end-December 2021.  
 Source: Japan Federation of Credit Guarantee Corporations; Published accounts of each financial institution; BOJ.

**Chart III-1-10: Outstanding amount of guaranteed liabilities**



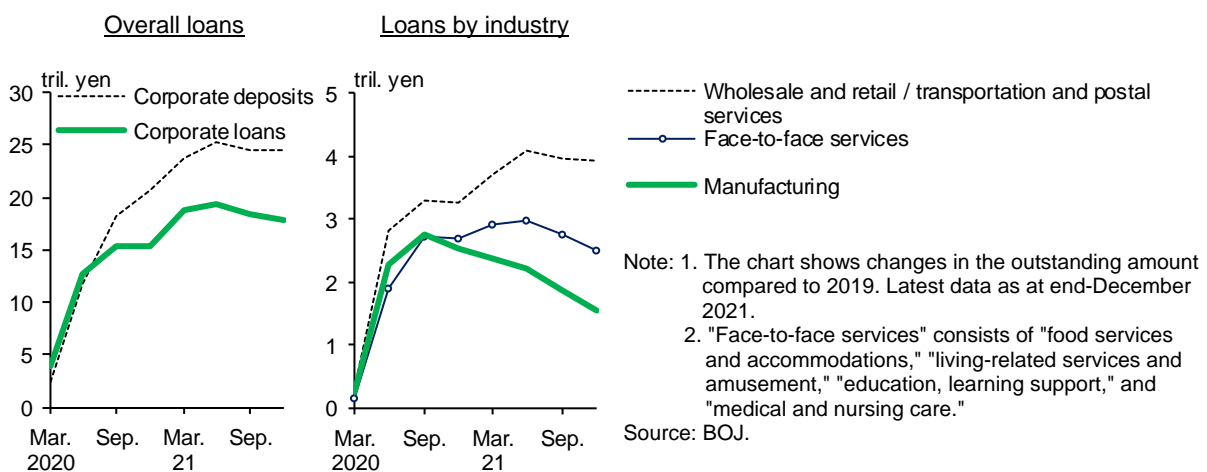
Note: The data for fiscal 2021 are as at end-January 2022.  
Source: Japan Federation of Credit Guarantee Corporations.

by credit guarantee corporations and loans by government-affiliated financial institutions -- expanded substantially in fiscal 2020 and has been more or less flat in fiscal 2021 as firms' precautionary demand for liquidity has subsided on the whole (Chart III-1-9). The outstanding amount of guaranteed liabilities has reached a size comparable to that seen in financial crises in the past (Chart III-1-10).

*Financing support for small firms by regional financial institutions*

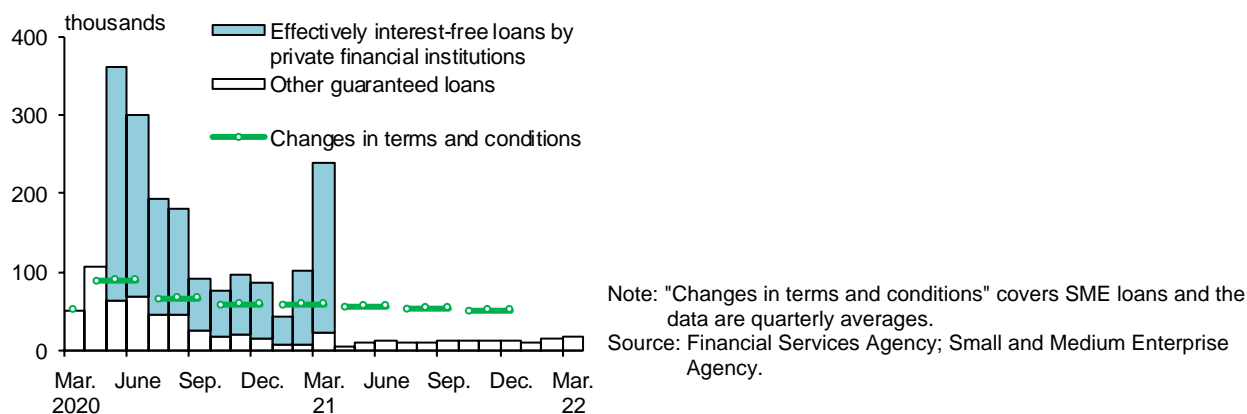
Many firms have secured on-hand liquidity for the time being, as corporate deposits at regional financial institutions have increased more than corporate loans since the start of the pandemic (Chart III-1-11). Under these circumstances, demand for additional funds has been low even for small firms. At present, while scheduled repayments of pandemic-related loans have been making progress, the number of applications for loans guaranteed by credit guarantee corporations and for changes in the terms and conditions of loans has remained at a low level (Chart III-1-12). Looking at recent developments in loans by industry, (1) the repayment of precautionary funds has made progress in the manufacturing sector and (2) additional borrowing has slowed in the face-to-face services industries (such as food services and accommodations) and other industries.

**Chart III-1-11: Corporate loans by regional financial institutions**



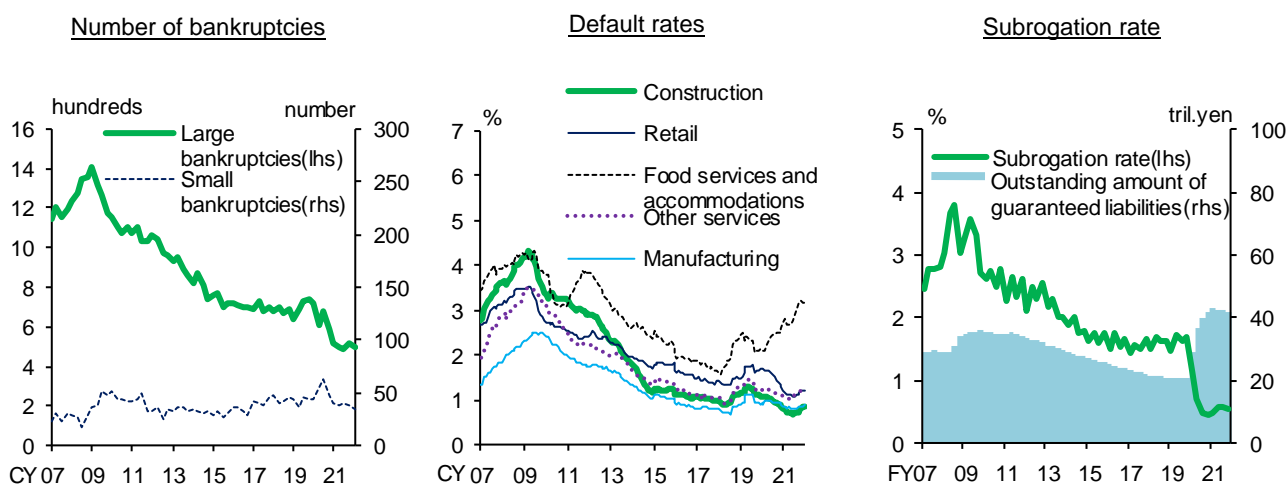
III. Examination of financial intermediation  
A. Financial intermediation by financial institutions

**Chart III-1-12: Number of applications for guaranteed loans and changes in terms and conditions**



The number of bankruptcies, default rates, and the subrogation rate have generally remained at low levels even with the repayment of pandemic-related loans, including effectively interest-free loans, gathering pace (Chart III-1-13).<sup>3</sup> So far, a rise in default rates has been limited to a few industries severely affected by the pandemic (such as the food services and accommodations industry). It is necessary to continue to carefully examine whether borrower firms can maintain their debt repayment capacity even as the impact of rising raw material prices and heightened geopolitical risks become additional factors that may cause a deterioration in their financial conditions.

**Chart III-1-13: Developments in bankruptcies, default rates, and subrogation rate**



Note: 1. In the left-hand chart, the data for the number of bankruptcies are quarterly averages. "Large bankruptcies" and "Small bankruptcies" indicate above and below 10 million yen of total debt, respectively. Latest data as at January-March 2022.  
2. In the middle chart, the default rates are calculated based on the default numbers (past due more than three months or classified as "in danger of bankruptcy" and below) for the past 12 months. Latest data as at January 2022.  
3. In the right-hand chart, the subrogation rate is calculated as annualized amount of subrogation divided by the outstanding amount of guaranteed liabilities. Latest date as at January-February 2022.

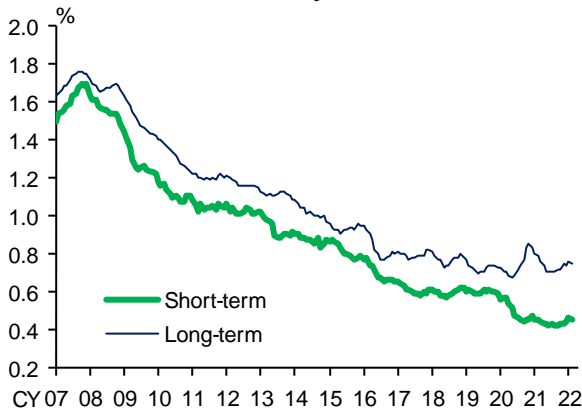
Source: Japan Federation of Credit Guarantee Corporations; The Risk Data Bank of Japan; Tokyo Shoko Research.

<sup>3</sup> The numbers of business closings and liquidations have also generally been low to date. According to the business register statistics of the Ministry of Justice, the number of business closures in fiscal 2021 is down by around 1 percent on a year-on-year basis.

### Developments in loan interest rates

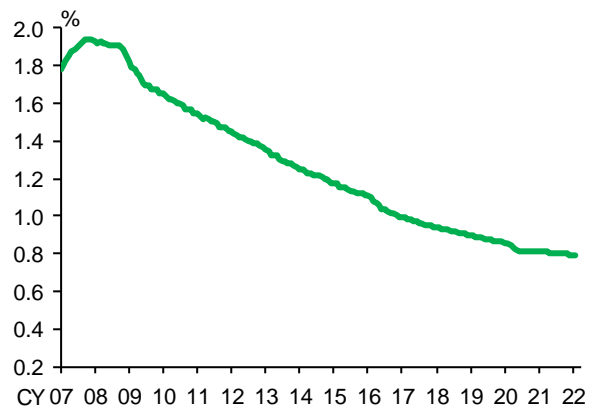
Financial institutions' average contract interest rates on new loans and discounts have been hovering around record low levels (Chart III-1-14). Meanwhile, the average interest rate on loans outstanding has been more or less flat (Chart III-1-15).

**Chart III-1-14: Average contract interest rates on new loans and discounts among domestically licensed banks**



Note: 6-month backward moving averages. Latest data as at February 2022.  
Source: BOJ, "Average contract interest rates on loans and discounts."

**Chart III-1-15: Average contract interest rates on outstanding loans and bills discounted among domestically licensed banks**

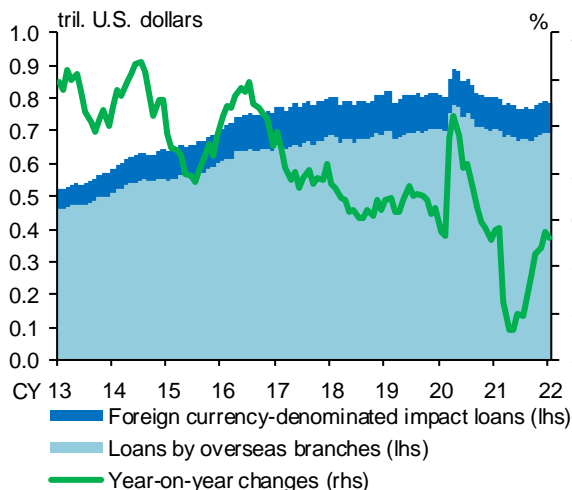


Note: Latest data as at February 2022.  
Source: BOJ, "Average contract interest rates on loans and discounts."

## 2. Overseas loans

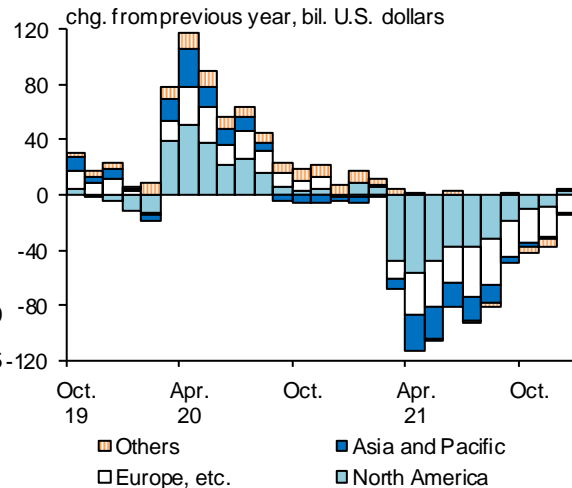
Overseas loans by major banks, which continued on a declining trend after a large temporary

**Chart III-1-16: Overseas loans outstanding among major banks**



Note: 1. "Loans by overseas branches" includes parts of foreign currency-denominated impact loans in accounts held by overseas branches. "Foreign currency-denominated impact loans" indicates banks' foreign currency-denominated loans to residents. "Year-on-year changes" represents the growth rate of the sum of "Loans by overseas branches" and "Foreign currency-denominated impact loans."  
2. On a non-consolidated basis. Latest data as at end-January 2022.  
Source: BOJ.

**Chart III-1-17: Overseas loans outstanding of the three major banks by region**

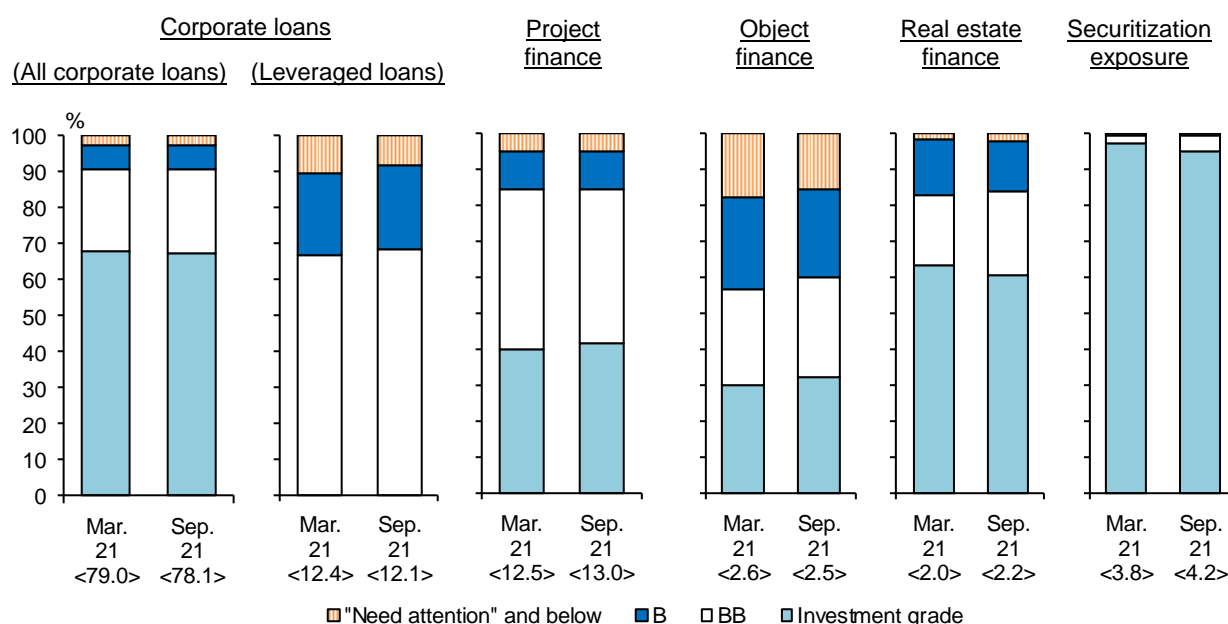


Note: 1. "Europe, etc." includes the Middle East and Africa.  
2. Latest data as at end-December 2021.  
Source: BOJ.

increase in spring 2020, have recently picked up in the United States, and thus the year-on-year rate of decline has narrowed (Charts III-1-16 and III-1-17). The pick-up in loans to the United States is mainly due to the steady demand for M&A financing amid strong M&A activity and the recovery in firms' demand for funds accompanying the resumption of economic activity.

Looking at the rating composition of overseas loans, investment grade (IG) loans have continued to account for about 70 percent of corporate loans (Chart III-1-18). Regarding object finance loans, which continued to see downgrades after the start of the pandemic, especially in the case of aircraft finance loans, the share of loans with a low rating, including those classified as "need attention" and below and those with a B rating, has recently started to decline. That said, the quality of loan portfolios remains in a worse state than before the pandemic, and continued attention needs to be paid to developments in industries and products that are susceptible to the pandemic.

**Chart III-1-18: Composition of overseas loans by type of product and credit rating among large financial institutions**



Note: 1. "Large financial institutions" includes major banks, Japan Post Bank, and a central organization of financial cooperatives. The data are as at month-end.

2. The figures in brackets indicate the share of the respective product types at each point in time.

Source: BOJ.

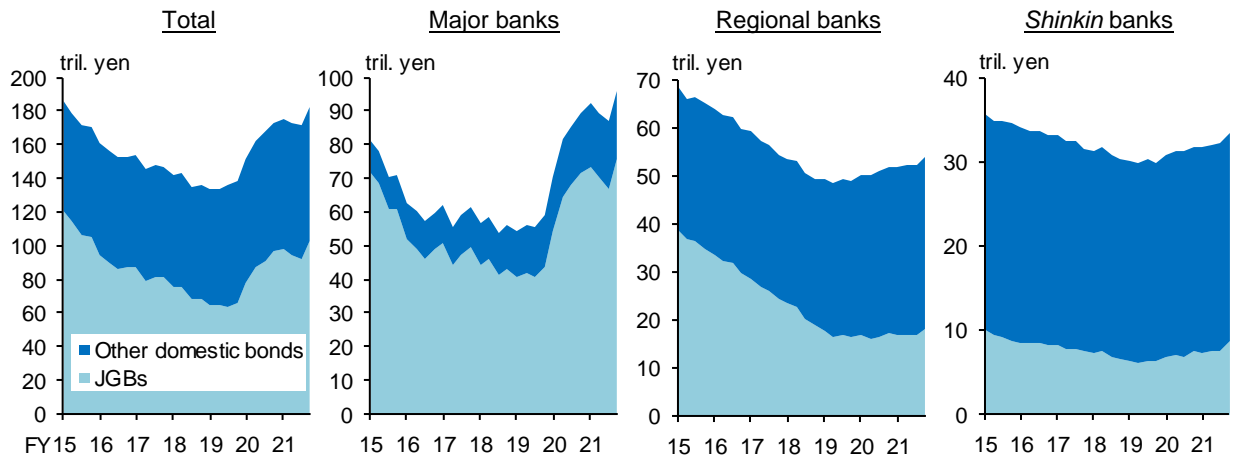
### 3. Securities investment

Financial institutions' holdings of yen-denominated bonds, including JGBs, municipal bonds, and corporate bonds, have been increasing of late (Chart III-1-19). Although some major banks sold such bonds to lock in gains when yen interest rates declined last year, others have recently increased their holdings in response to the rise in interest rates. The amount of regional financial institutions' holdings of these securities is more or less unchanged: while the redemption of their JGB holdings progressed, redeemed funds were reinvested in response to the rise in interest rates.

Holdings of foreign bonds (calculated in yen terms) have declined (Chart III-1-20). The holdings of major banks have decreased recently due to concerns about a rise in overseas interest rates. Regional financial institutions have held back from increasing their holdings of foreign bonds while some have reduced their holdings.



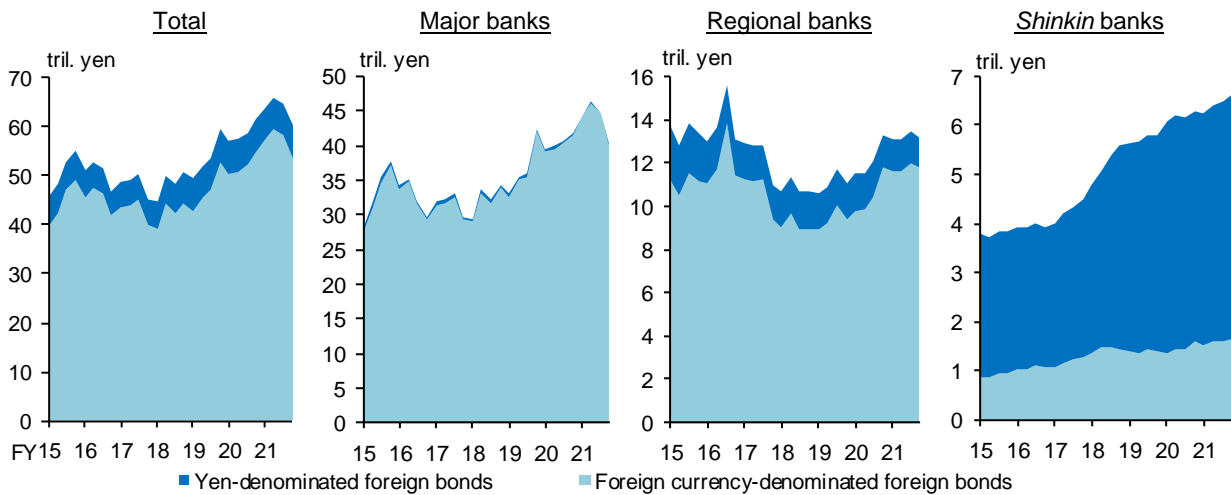
**Chart III-1-19: Outstanding amount of yen-denominated bonds among financial institutions**



Note: The data are the sum of figures for domestic and overseas branches, based on the outstanding amount at month-end. Latest data as at end-February 2022.

Source: BOJ.

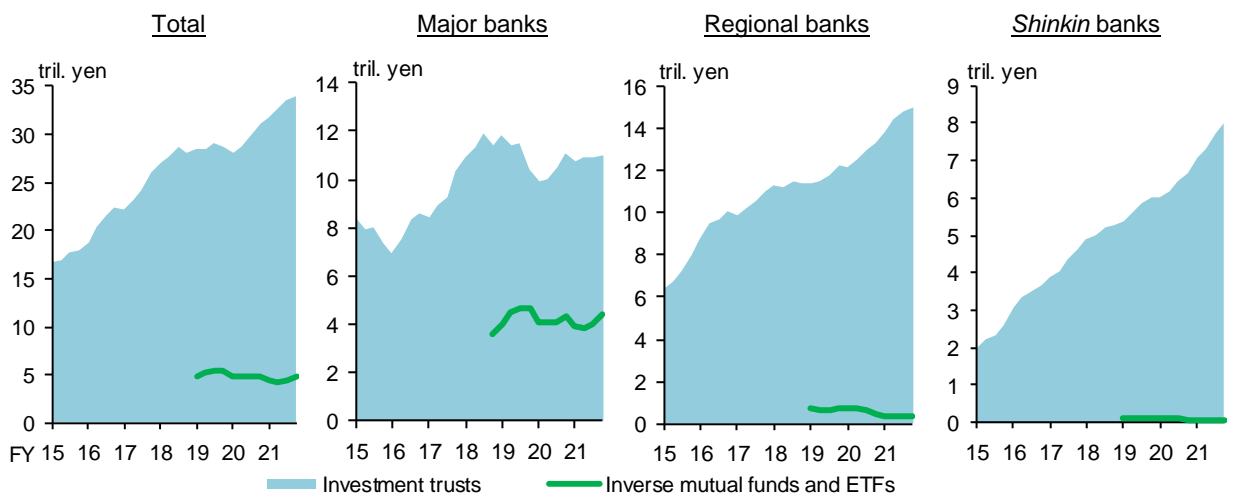
**Chart III-1-20: Outstanding amount of foreign bonds among financial institutions**



Note: The data are the sum of figures for domestic and overseas branches, based on the outstanding amount at month-end. Latest data as at end-February 2022.

Source: BOJ.

**Chart III-1-21: Outstanding amount of investment trusts among financial institutions**



Note: 1. The data include some securities other than investment trusts.

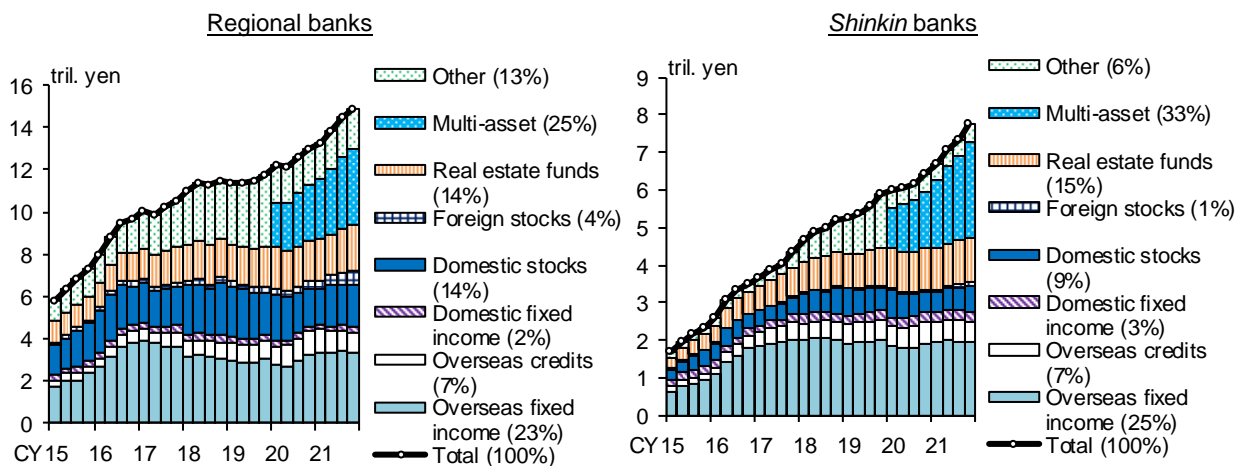
2. The data are the sum of figures for domestic and overseas branches, including domestic and foreign investment trusts, based on the outstanding amount at month-end. Latest data as at end-February 2022.

Source: BOJ.

III. Examination of financial intermediation  
A. Financial intermediation by financial institutions

While financial institutions' holdings of investment trusts had continued to increase, the pace of increase has decelerated of late (Chart III-1-21). Major banks have reduced their holdings of stock investment trusts amid an adjustment in the global stock market, and some have purchased inverse equity mutual funds. Although regional financial institutions have continued to increase their holdings of investment trusts with the aim of raising their interest and dividend income, some held back on investing and others reduced their holdings through the end of the fiscal year amid the deterioration of market conditions (Chart III-1-22).

**Chart III-1-22: Breakdown of outstanding amount of investment trusts among regional financial institutions**

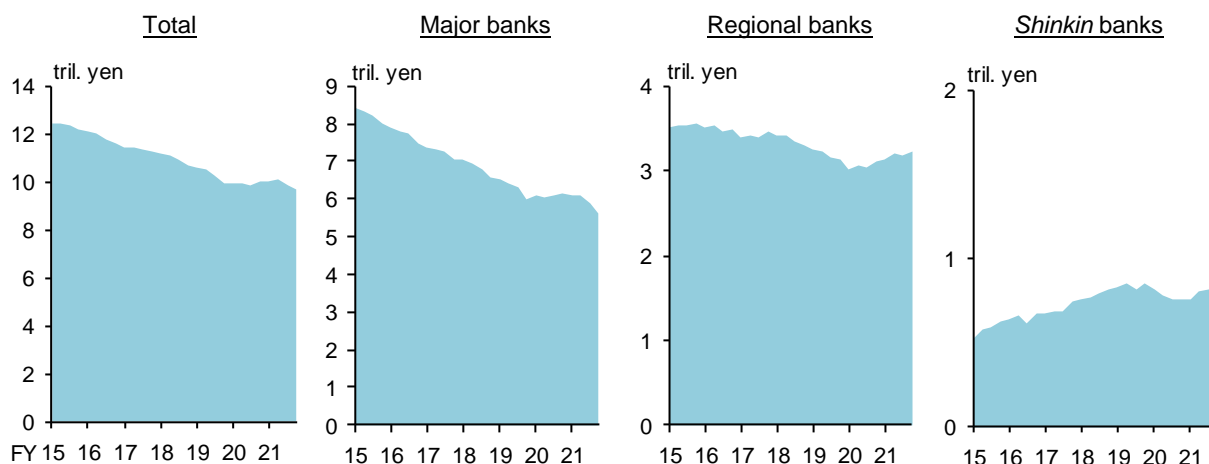


Note: 1. Based on book values. The figures in parentheses in the chart indicate the share of the respective product types in the latest period.  
2. "Other" includes other foreign securities.  
3. Up to end-December 2019, "Other" includes "Multi-asset."  
4. Latest data as at end-December 2021.

Source: BOJ.

Meanwhile, financial institutions' stockholdings have been declining moderately (Chart III-1-23). Strategic stockholdings, i.e., stockholdings for the purpose of maintaining business ties with firms, have continued to fall, partly as a response to growing social awareness regarding corporate governance.

**Chart III-1-23: Outstanding amount of stockholdings among financial institutions**

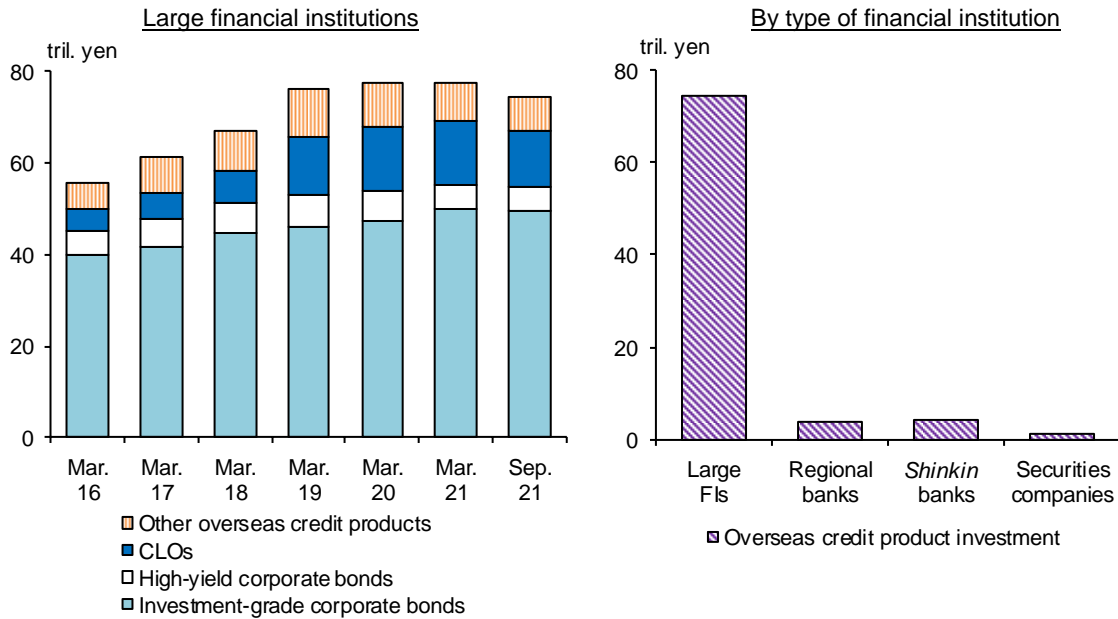


Note: 1. Based on the outstanding amount on a book value basis at month-end. The data exclude foreign stockholdings.  
2. The data for major banks are figures for domestic branches and the data for other banks are the sum of figures for domestic and overseas branches. Latest data as at end-February 2022.

Source: BOJ.

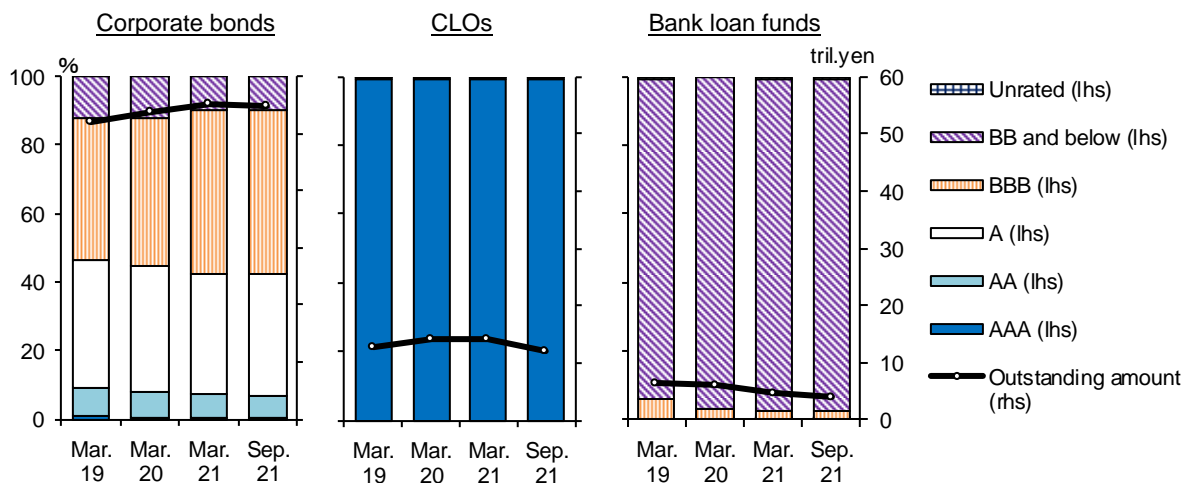
The outstanding amount of overseas credit products held by Japanese financial institutions as a whole, including Japan Post Bank and a central organization of financial cooperatives, has declined slightly of late due to a fall in holdings of collateralized loan obligations (CLOs) (Chart III-1-24). With credit spreads widening recently, some financial institutions have remained cautious. However, others are considering a more active investment stance going forward with the aim of improving their profitability in the medium to long term. Compared to large financial institutions, regional financial institutions continue to have little exposure to overseas credit products.

**Chart III-1-24: Outstanding amount of overseas credit product investment among financial institutions**



Note: 1. "Large financial institutions" includes major banks, Japan Post Bank, and a central organization of financial cooperatives.  
 2. Data for "By type of financial institution" are as at end-September 2021.  
 Source: BOJ.

**Chart III-1-25: Composition of overseas credit product investment among large financial institutions by credit rating**



Note: Covers major banks, Japan Post Bank, and a central organization of financial cooperatives.  
 Source: BOJ.

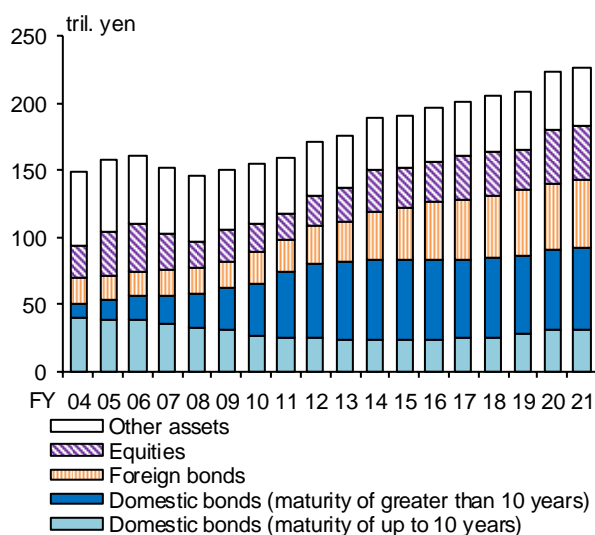
The outstanding amount of overseas credit product investment by large financial institutions by credit rating shows no major change in the share of holdings by credit rating, and no deterioration in the quality of overseas credit portfolios has been observed. The overall credit quality of large financial institutions' portfolios remains high. These institutions' holdings of securitized products, including CLOs, consist almost entirely of AAA-rated tranches, i.e., tranches with the highest credit rating, and about 90 percent of bond holdings consist of investment-grade bonds (BBB and above) (Chart III-1-25). That said, bonds with a BBB rating, the lowest investment-grade rating, account for just below 50 percent of total bond holdings, and some institutions hold bank loan funds, which are predominantly backed by non-investment grade (BB or below) loans.

## B. Financial intermediation by non-bank financial intermediaries

### 1. Insurance companies and pension funds

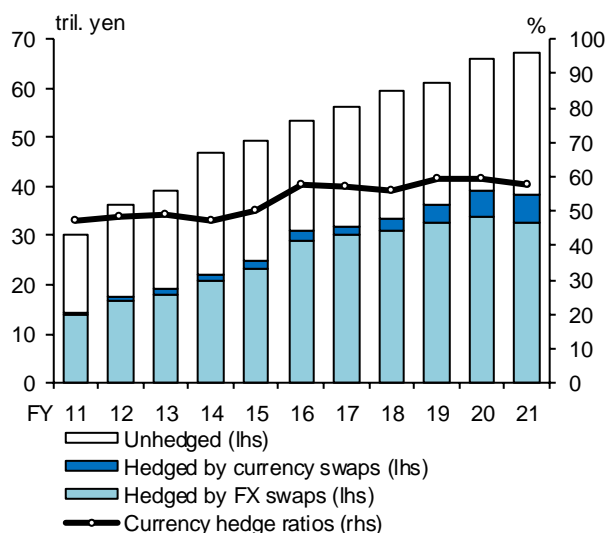
Life insurance companies have continued to invest in super-long-term JGBs in order to reduce the duration mismatch between assets and liabilities (Chart III-2-1). Turning to foreign securities, although there was a large number of bond redemptions, life insurance companies' holdings of foreign securities have increased, due mainly to the rise in stock prices (Chart III-2-2). Looking at recent developments in investments, life insurance companies have continued to invest in hedged U.S. investment-grade bonds, and some have increased their currency-unhedged investment to increase profits.

**Chart III-2-1: Investment assets outstanding among life insurance companies**



Note: 1. "Other assets" includes cash and deposits, loans, investment trusts, and real estate.  
 2. Covers nine major life insurance companies.  
 Based on general accounts. The data for fiscal 2021 are as at end-September 2021.  
 Source: Published accounts of each company.

**Chart III-2-2: Currency hedge ratios for foreign securities investment among life insurance companies**

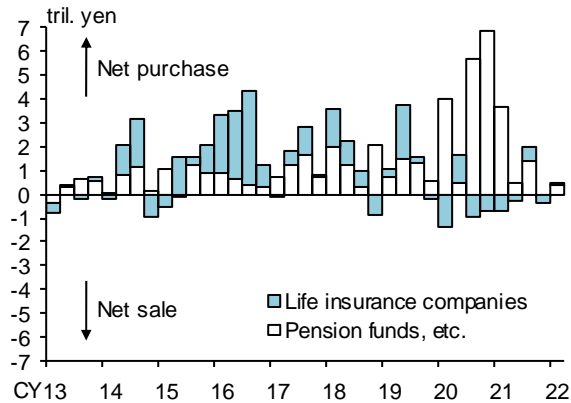


Note: Covers nine major life insurance companies.  
 Estimated based on general accounts. The data for fiscal 2021 are as at end-September 2021.  
 Source: Published accounts of each company.

Pension funds have continued to invest in foreign securities while rebalancing their portfolios in response to rising stock prices, although the pace of increase has decelerated (Charts III-2-3 and III-2-4). Specifically, the Government Pension Investment Fund (GPIF), which is in charge of

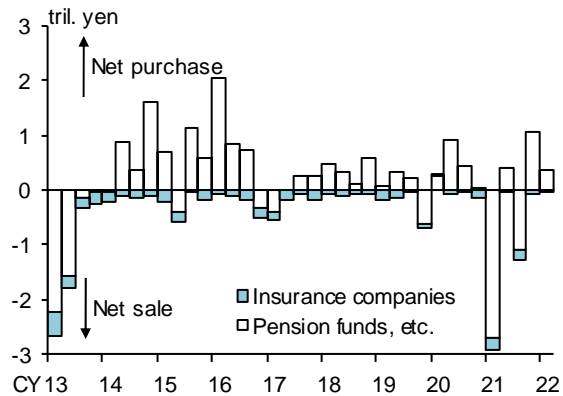
managing the assets of public pension funds such as employees' pension funds and the national pension fund, has maintained its asset portfolio allocation by, for example, rebalancing its portfolio in response to changes in stock prices in line with the basic portfolio allocation, which determines the fund's portfolio share of each asset class from the perspective of safe and efficient asset management over a long-term investment horizon. Meanwhile, with corporate pension funds maintaining their cautious investment stance toward risk-taking, a similar rebalancing was seen in response to rising stock prices.

**Chart III-2-3: Medium- and long-term foreign bond investments by institutional investors**



Note: 1. "Pension funds, etc." indicates trust accounts of banks and trust banks.  
 2. Latest data as at January-February 2022.  
 Source: Ministry of Finance.

**Chart III-2-4: Stock investments by institutional investors**

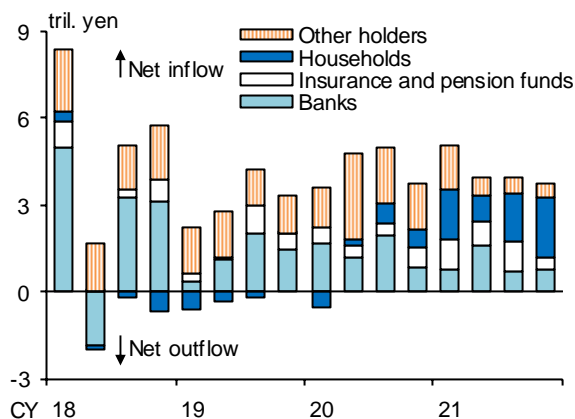


Note: 1. "Pension funds, etc." indicates banking and trust accounts of trust banks.  
 2. Latest data as at January-February 2022.  
 Source: Tokyo Stock Exchange.

## 2. Securities investment trusts

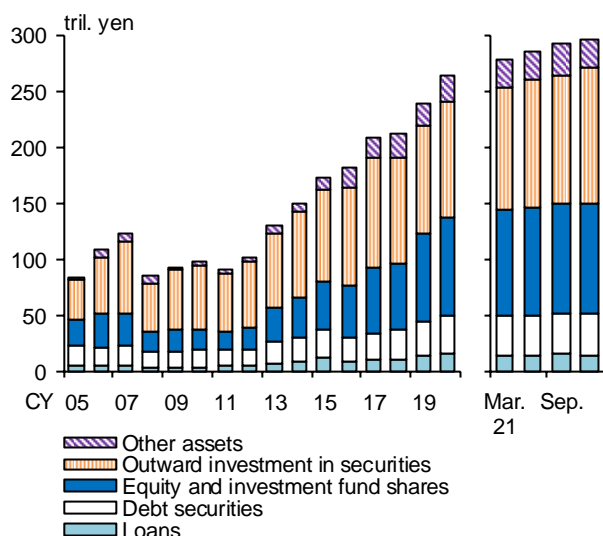
Japanese investment trusts have continued to see steady inflows of funds (Chart III-2-5). Assets under management have continued to increase, reflecting the steady inflows of funds and the recent rise in stock prices (Chart III-2-6). By type of holder, securities investment trust holdings by households have seen a substantial increase (Chart III-2-7).

**Chart III-2-5: Decomposition of flows of investment trusts**



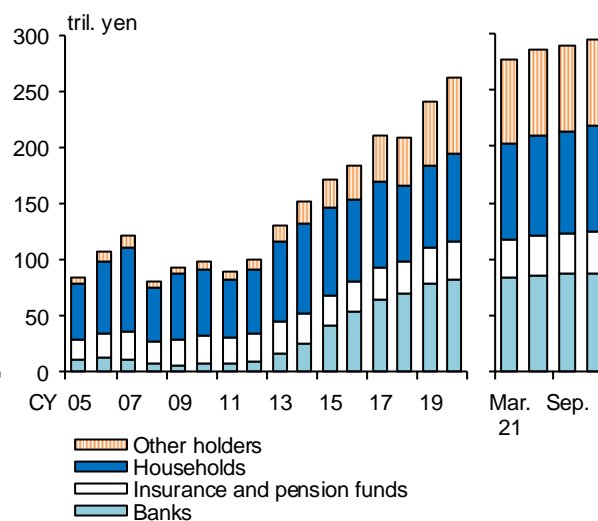
Note: Latest data as at the October-December quarter of 2021.  
 Source: BOJ, "Flow of funds accounts."

**Chart III-2-6: Investment assets outstanding among investment trusts**



Note: 1. Breakdown of investment assets held by securities investment trusts.  
2. Latest data as at end-December 2021.  
Source: BOJ, "Flow of funds accounts."

**Chart III-2-7: Outstanding amount of investment trusts by type of holder**



Note: 1. Breakdown of investment trust beneficiary certificates by type of holder.  
2. Latest data as at end-December 2021.  
Source: BOJ, "Flow of funds accounts."

## C. Financial cycle and vulnerability

### 1. Heat map

This section examines Japan's current financial cycle based on financial intermediation activities, using the heat map and other tools. The heat map is a tool to regularly monitor and assess developments in FAIXs, comprising indicators that deviated substantially from their trend during the bubble period in the late 1980s, for the early detection of financial imbalances caused by overheating of financial activities. In the current heat map, 10 out of the 14 FAIXs are "green," which signals neither overheating (a certain upward deviation from the trend) nor a contraction (a certain downward deviation from the trend), and four FAIXs are "red," which signals a large upward deviation from the trend. Specifically, compared with the previous issue of the *Report*, one FAIX -- the *growth rate of M2* -- has turned from "red" to "green" while the other four FAIXs -- the *total credit to GDP ratio*, the *household loans to GDP ratio*, the *corporate credit to GDP ratio*, and the *real estate loans to GDP ratio* -- are still "red" (Charts III-3-1, III-3-2, and III-3-3).<sup>4</sup>

The four FAIXs that are "red" all have nominal GDP in the denominator, meaning that the fact that they are signaling "red" is largely due to developments in nominal GDP since the outbreak of COVID-19. Moreover, all four relate to credit, and the fact that they are signaling "red" likely also reflects the proactive implementation of measures to support corporate financing and the fact that financial intermediation activities are operating smoothly. Therefore, the four "red" FAIXs can be regarded as the result of financial institutions responding to the demand for working capital,

<sup>4</sup> In Chart III-3-1, the colors represent the following: (1) red indicates that an indicator is above its upper threshold; (2) blue indicates that an indicator is below its lower threshold; (3) green indicates no signs of either extreme; and (4) white indicates that no data for that period are available. For details on the FAIXs, see Ito, Y., Kitamura, T., Nakamura, K., and Nakazawa, T., "New Financial Activity Indexes: Early Warning System for Financial Imbalances in Japan," Bank of Japan Working Paper, no. 14-E-7, April 2014.

including precautionary demand, caused by the sharp decline in sales due to the pandemic, and do not signal overheating of financial activities.

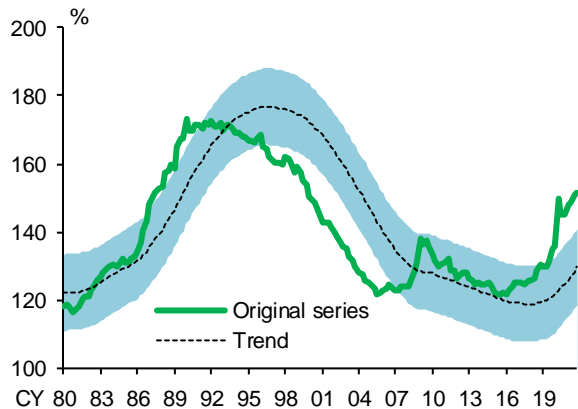
**Chart III-3-1: Heat map**

		CY 80	81	82	83	84	85	86	87	88	89	90	91	92	93	94	95	96	97	98	99	00	01	02	03	04	05	06	07	08	09	10	11	12	13	14	15	16	17	18	19	20	21	22
Financial institutions	DI of lending attitudes of financial institutions	[Heat map grid]																																										
	Growth rate of M2	[Heat map grid]																																										
Financial markets	Equity weighting in institutional investors' portfolios	[Heat map grid]																																										
	Stock purchases on margin to sales on margin ratio	[Heat map grid]																																										
Private sector	Private investment to GDP ratio	[Heat map grid]																																										
	Total credit to GDP ratio	[Heat map grid]																																										
Household	Household investment to disposable income ratio	[Heat map grid]																																										
	Household loans to GDP ratio	[Heat map grid]																																										
Corporate	Business fixed investment to GDP ratio	[Heat map grid]																																										
	Corporate credit to GDP ratio	[Heat map grid]																																										
Real estate	Real estate firms' investment to GDP ratio	[Heat map grid]																																										
	Real estate loans to GDP ratio	[Heat map grid]																																										
Asset prices	Stock prices	[Heat map grid]																																										
	Land prices to GDP ratio	[Heat map grid]																																										

Note: The latest data for stock prices are as at the January-March quarter of 2022. The latest data for the land prices to GDP ratio are as at the July-September quarter of 2021. The latest data for the other indicators are as at the October-December quarter of 2021.

Source: Bloomberg; Cabinet Office, "National accounts"; Japan Real Estate Institute, "Urban land price index"; Ministry of Finance, "Financial statements statistics of corporations by industry"; Tokyo Stock Exchange, "Outstanding margin trading, etc."; BOJ, "Flow of funds accounts," "Loans and bills discounted by sector," "Money stock," "Tankan."

**Chart III-3-2: Total credit to GDP ratio**

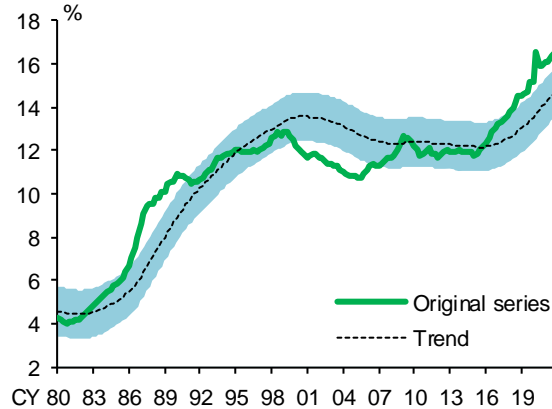


Note: 1. "Trend" is calculated using the one-sided HP filter. The shaded area indicates the root mean square of the deviation from the trend.

2. 4-quarter backward moving averages. Latest data as at the October-December quarter of 2021.

Source: Cabinet Office, "National accounts"; BOJ, "Flow of funds accounts."

**Chart III-3-3: Real estate loans to GDP ratio**



Note: 1. "Trend" is calculated using the one-sided HP filter. The shaded area indicates the root mean square of the deviation from the trend.

2. 4-quarter backward moving averages. Latest data as at the October-December quarter of 2021.

Source: Cabinet Office, "National accounts"; BOJ, "Loans and bills discounted by sector."

In the process of the economy returning to a steady growth path, it is expected that corporate profits will recover and debt repayment will proceed smoothly. However, if, for some reason, such as a downward shift in the path of the growth rate or corporate profits, debt repayment did not proceed smoothly, total credit could turn out to be excessive relative to the level of real economic activity. Therefore, if for some reason the pace of firms' debt repayment stalls and the *total credit to GDP ratio* remains "red" for a protracted period, increased vigilance will be required with regard to the risk of financial imbalances building up.<sup>5</sup>

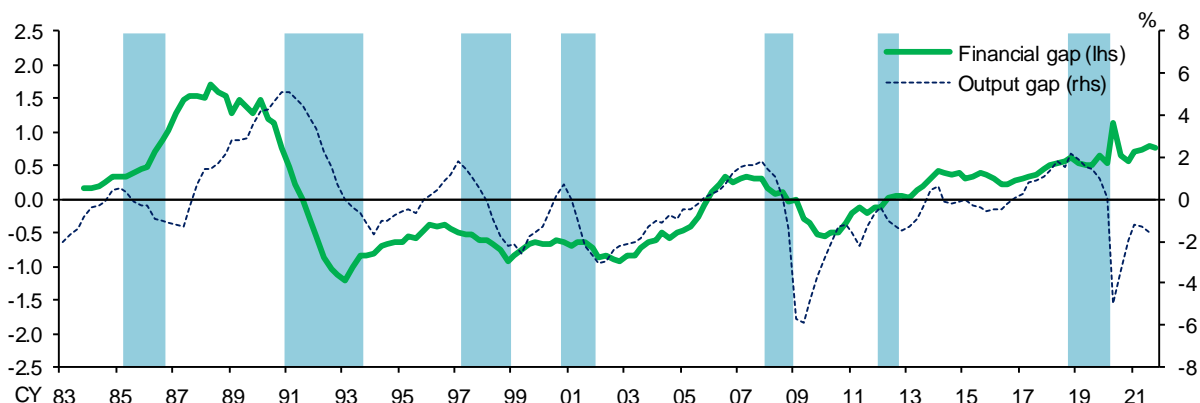
<sup>5</sup> Cross-country evidence of banking crises since 1980 shows that the probability of a subsequent crisis tends to be greater the longer the total credit to GDP ratio signals "red" for a protracted period or when that ratio and certain other financial activity indexes simultaneously signal "red." For details, see Box 1 in the April 2021 issue of the Report.

Of the FAIXs that are "red," credit in the *total credit to GDP ratio* and the *real estate loans to GDP ratio* was already increasing before the outbreak of COVID-19. Regional financial institutions have been active in risk-taking with regard to lending to domestic middle-risk firms, lending to the real estate industry, particularly to rental real estate businesses, and investment in domestic and overseas investment trusts, while major banks have been active in risk-taking mainly with regard to overseas lending and overseas credit product investment, as well as in lending related to large-scale M&A deals. In this situation, lending to low-return borrowers, which carries the risk that loan interest rates are not high enough to cover credit costs, has been on an uptrend. It is necessary to continue to closely monitor how the existing vulnerabilities will evolve during the spread of the pandemic and the resultant increase in lending. (As for vulnerabilities that have been present since before the outbreak of the pandemic in lending to the real estate industry and firms, see Section E of Chapter IV.)

## 2. Financial gap and GDP-at-risk (GaR)

The "financial gap," which is constructed by calculating the weighted average of the deviation rates of individual FAIXs in the heat map from their trends, has remained clearly positive, although the positive gap has narrowed compared with the peak in fiscal 2020 (Chart III-3-4).

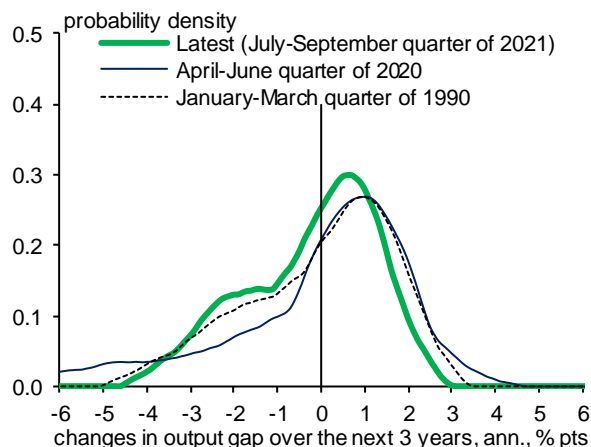
**Chart III-3-4: Financial gap and output gap**



Note: The latest data for the output gap and financial gap are as at the July-September quarter and the October-December quarter of 2021, respectively. The shaded areas indicate recession phases.

Source: Cabinet Office; BOJ.

**Chart III-3-5: Comparison of risks to economic growth by period**



Note: Based on the data at the time of the release of the output gap for the July-September quarter of 2021.



A look at the estimated probability distribution of GDP growth rates over the next three years conditional on the developments in the financial gap in terms of "GDP-at-risk" (GaR) shows that, although the lower tail of the distribution was fatter than during the bubble period at one point after the outbreak of COVID-19, it has shrunk since then, albeit with some fluctuations, suggesting that tail risks to the real economy have declined (Chart III-3-5).<sup>6</sup> This is due to the fact that, compared with immediately after the outbreak of the pandemic, the positive "financial gap" has narrowed, and the output gap has improved as the economy picks up.

However, as the course of the pandemic and its impact on the domestic and overseas economies remain uncertain, attention needs to be paid to the possibility that, depending on the impact of the pandemic, the existing vulnerabilities underlying developments in the financial gap could lead to a full-fledged adjustment on the financial front.

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<sup>6</sup> Specifically, the regression equation for GaR is as follows:

$$\left( \begin{array}{c} \text{changes in the output gap} \\ \text{over the next } Y \text{ years} \end{array} \right) = \alpha \left( \begin{array}{c} \text{changes in the output gap} \\ \text{from the previous period} \end{array} \right) + \beta(\text{financial gap}) + \gamma(\text{U.S. NFCI}) + \delta.$$

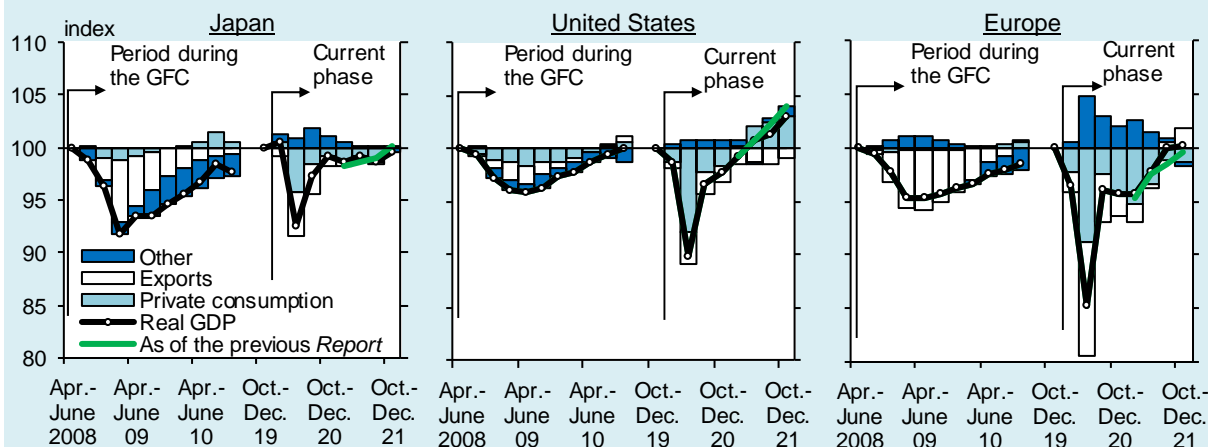
For details on the GaR approach, including the underlying rationale, estimation method, and caveats regarding its use, see Section B of Chapter IV and Box 1 of the October 2018 issue of the *Report*.

## IV. Risks faced by financial institutions

### Risks that warrant particular attention

- Due to the spread of COVID-19, domestic and overseas economies experienced a significant downturn, particularly in the first half of 2020. Although the pace of economic recovery since then has been moderate, the Japanese, U.S., and European economies have generally recovered in line with the average forecasts by research institutions and market expectations at the time of the previous *Report* (Chart IV-1-1).

Chart IV-1-1: GDP levels in current phase and during GFC



Note: Indexation with the real GDP in the April-June quarter of 2008 is set at 100 for the period during the GFC and that in the October-December quarter of 2019 is set at 100 for the current phase. "As of the previous *Report*" indicates the average forecasts of professionals and markets in September 2021.

Source: BEA; Cabinet Office; Eurostat; IMF; Japan Center for Economic Research, "ESP forecast."

- Although Japan's economy is likely to recover with the impact of COVID-19 waning gradually, there is high uncertainty over the impact of the pandemic and supply constraints on domestic and overseas economies. In global financial markets, due attention needs to be paid to the possibility that prices of risky assets will correct in the event of, for example, a sudden rise in U.S. long-term interest rates, as well as depending on developments in the spread of COVID-19 and geopolitical risks.<sup>7</sup>
- With a view to ensuring the stability of Japan's financial system, the following risks warrant attention: (1) the impact of the pandemic on credit costs of domestic loans; (2) the risk that global economic and financial shocks will have an adverse impact on overseas lending, securities investment, and foreign currency funding; and (3) the risk associated with vulnerabilities that have been present since before the pandemic.

### Domestic credit risk

- Many large firms have secured ample liquidity and capital relative to small and medium-sized enterprises (SMEs), and their financial bases have therefore remained robust, as seen before the pandemic. Although SMEs' resilience in terms of financing has been maintained on the whole, a fair number of SMEs -- particularly in the face-to-face services industry -- have continued to face a severe situation in terms of debt repayment capacity.
- The analysis shows that the overall probability of default (PD) of SMEs remains at a fairly low level and financial institutions' credit cost ratio also remains low, due in part to the impact of measures to support corporate financing. However, there is a possibility that the PD will

<sup>7</sup> The impact of the situation in Ukraine on Japan's financial system is discussed in Box 5. Although the impact is likely to be limited at this point, there is high uncertainty over future developments and attention should be paid to the possibility that the impact on the financial system will become larger, possibly through an adjustment in global financial markets.

increase significantly particularly for the face-to-face services industry. In addition, the analysis indicates that, depending on factors including developments in corporate profits at the macro-level and the degree of heterogeneity in the pace of recovery in corporate profits across industries and firms, firms' PD and financial institutions' credit cost ratio may rise in the medium term.

### Overseas credit risk

- The quality of Japanese banks' overseas loan portfolios has remained high on the whole as the deterioration in the quality of loan portfolios seen in some industries due to the pandemic has come to a halt.
- A comparison of Japanese banks' overseas loan portfolios and those of major U.S. commercial banks suggests that the impacts of a rise in U.S. interest rates on the PDs of their loan portfolios do not differ from each other much. However, attention should be paid to the fact that Japanese banks seem to be more susceptible to the impact of a widespread deterioration in financial conditions.

### Market risk associated with securities investment

- The amount of interest rate risk associated with the yen-denominated bond investments has reached the highest level, and the amount of market risk associated with stockholdings has been at a level that is large enough to have a substantial impact on financial institutions' financial soundness and profits. The amount of interest rate risk associated with foreign currency-denominated bond investments generally has been limited and the portfolio of overseas credit products is managed cautiously against risks on the whole.
- Interlinkages between the domestic and international financial systems have been increasing, and attention needs to be paid to the possibility that Japanese financial institutions are more susceptible to shocks in global financial markets.

### Foreign currency funding risk

- Looking at major banks' foreign currency balance sheets, the outstanding amount of loans has generally been in line with that of stable funding such as deposits and corporate bonds, and thus the "stability gap," which is the difference between the two, has been around zero.
- Japanese banks have increased their transaction account deposits in recent years. This increase may reduce outflows of deposits in the event of a crisis and thereby improve the stability of foreign currency funding. When interest rates rise, it may also work in the direction of widening deposit-lending spreads and thus have a favorable impact on profits.

### Risks resulting from vulnerabilities that have been present since before the pandemic

- With regard to lending to firms, credit costs increased slightly before the pandemic, particularly for (1) "financially weak firms," (2) "cross-border borrowers," and (3) "new transaction partners." Although no major vulnerabilities have materialized so far in lending to these borrowers, it is necessary to continue to closely monitor how these vulnerabilities will evolve during the spread of the pandemic and the resultant increase in lending.
- Lending to the real estate industry has been increasing, particularly to rental real estate businesses. Profits of rental real estate businesses have been stable and less susceptible to economic fluctuations. However, attention needs to be paid to the risk that changes in demographics and competitive environment in the medium to long term may push down profits in rental real estate businesses and also land values.

## A. Domestic credit risk

### 1. Financial institutions' credit costs and breakdown of loans by borrower classification

The credit cost ratios of Japanese financial institutions have remained low. Although major banks' credit cost ratio increased in fiscal 2020 due to, for example, a rise in loan-loss provisioning for some industries that have been significantly affected by the pandemic and an expansion in the coverage of precautionary loan-loss provisioning, it declined in the first half of fiscal 2021 as the number of bankruptcies and default rates on the whole have remained low (Chart IV-1-2). Regional banks' credit cost ratio, after having risen slightly in fiscal 2020, due in part to the impact of precautionary loan-loss provisioning, also declined in the first half of fiscal 2021.

Looking at loans by borrower classification, the share of normal loans remains high at major and regional banks, exceeding the peak before the global financial crisis (GFC), but the share has been declining recently, particularly at regional and *shinkin* banks, and the share of loans needing attention has risen slightly (Chart IV-1-3).

Chart IV-1-2: Credit cost ratios by type of bank

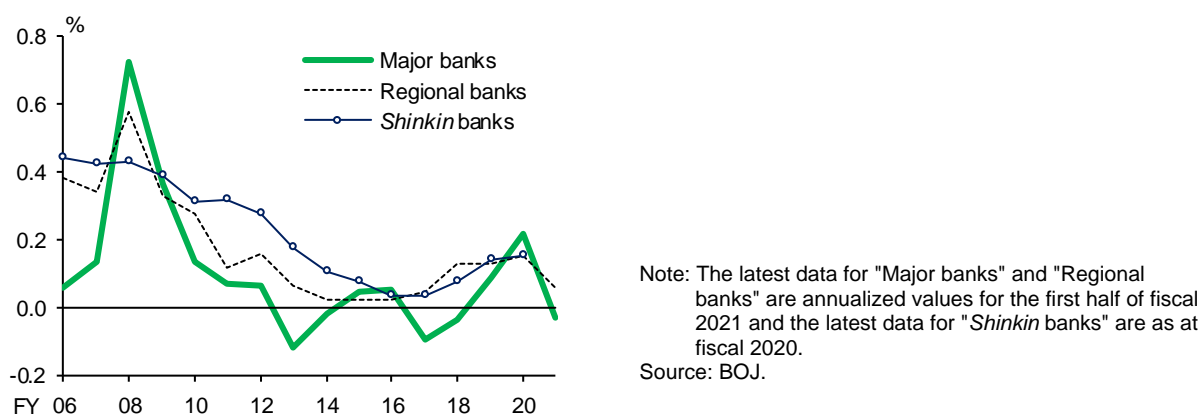
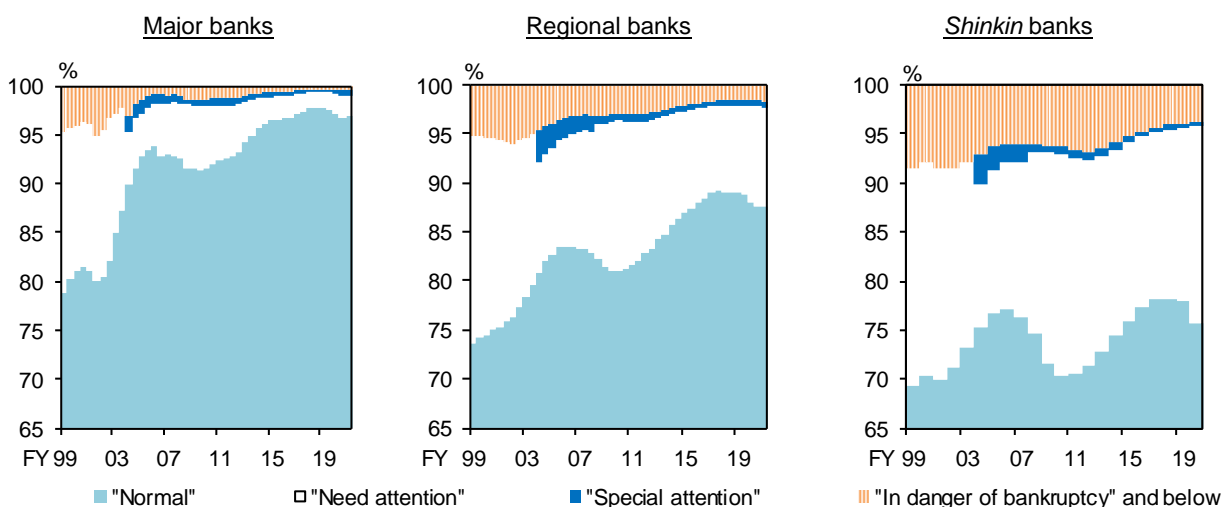


Chart IV-1-3: Breakdown of loans by borrower classification

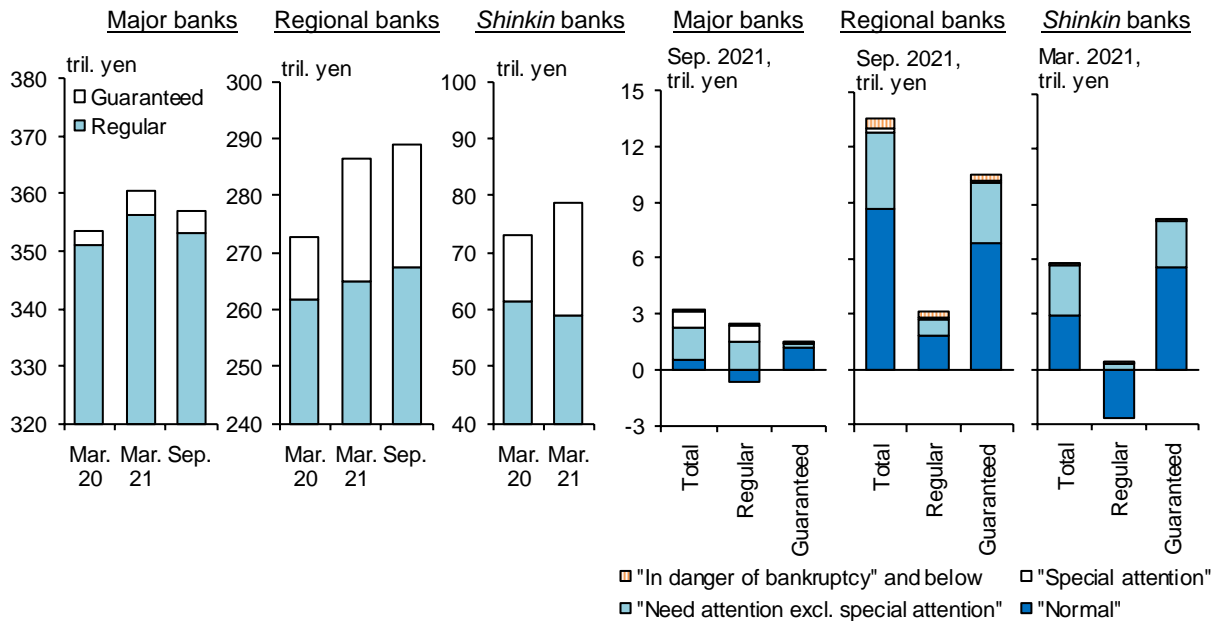


Note: 1. The charts exclude loans having no borrower classification and loans to local governments.  
2. "Need attention" indicates "Need attention excluding special attention" from fiscal 2004.  
3. The latest data in the left-hand and middle charts are as at end-September 2021, and the latest data in the right-hand chart are as at end-March 2021.  
Source: BOJ.

## 2. Changes in loans since the outbreak of COVID-19

The following is an overview of loans since the outbreak of the pandemic. First, a look at regular loans and loans guaranteed by credit guarantee corporations separately shows that, at regional financial institutions, for which loans to a large extent consist of those to SMEs, loans guaranteed by credit guarantee corporations have increased substantially (Chart IV-1-4).<sup>8</sup> Since these loans are secured by credit guarantees and the burden of losses that result from firm defaults is smaller,

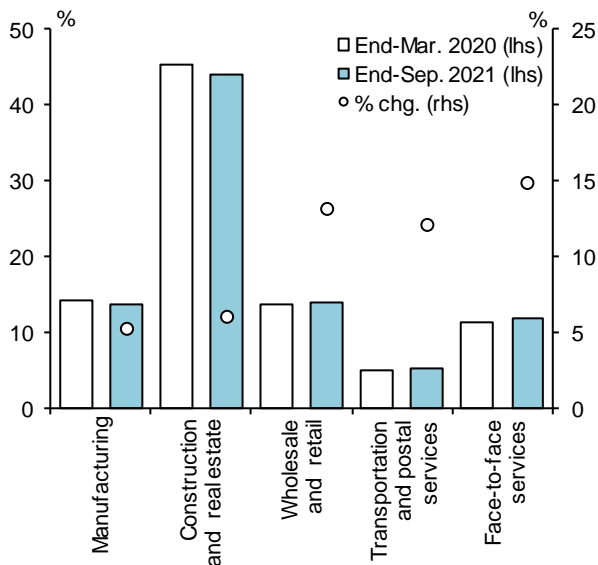
**Chart IV-1-4: Loans outstanding since the outbreak of COVID-19 by type of bank**



Note: The right-hand charts indicate changes from March 2020 (excluding loans having no borrower classification and loans to local governments).

Source: BOJ.

**Chart IV-1-5: Breakdown of loans to SMEs by industry**



Note: 1. Covers regional banks and *shinkin* banks.  
 2. "Face-to-face services" consists of food, accommodation, and consumer services. The same applies to subsequent charts.  
 3. "% chg." indicates changes in loans to SMEs from end-March 2020 to end-September 2021.  
 Source: BOJ, "Loans and bills discounted by sector."

<sup>8</sup> The increase in loans guaranteed by credit guarantee corporations since the outbreak of the pandemic is considered to be attributed to the increase in effectively interest-free loans.

IV. Risks faced by financial institutions  
 A. Domestic credit risk

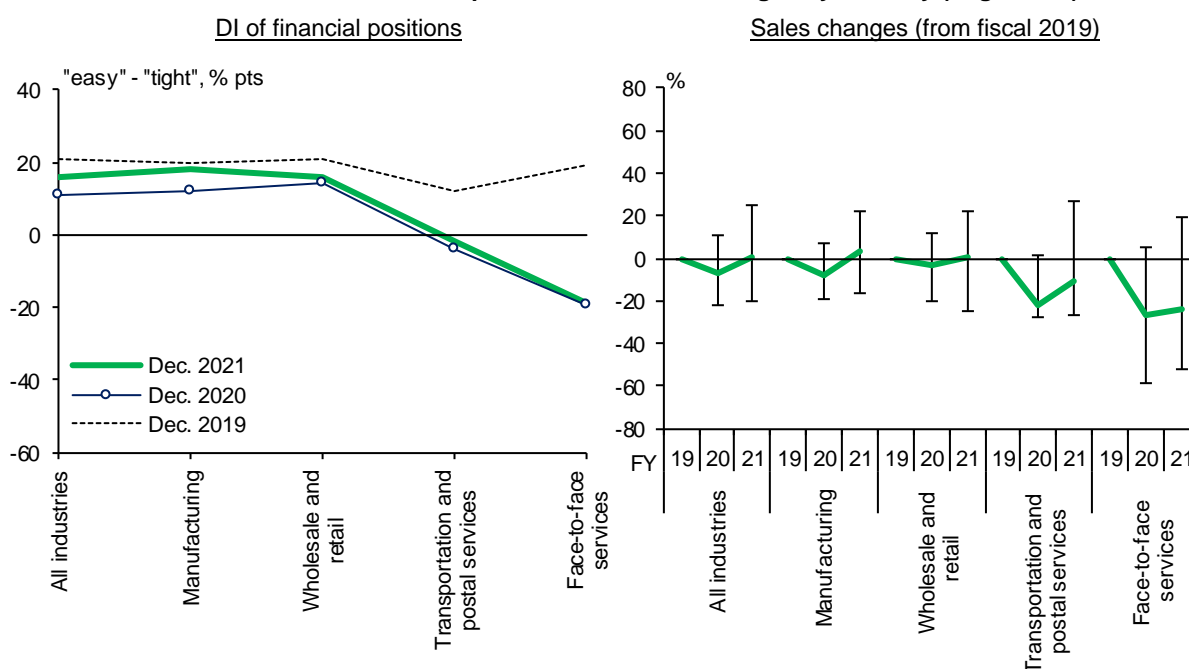
they likely lower financial institutions' credit cost ratio. Next, looking at loans by borrower classification, normal loans have increased significantly, due in part to the increase in precautionary borrowing, while those to borrowers classified as "need attention" and below have also increased, reflecting, for example, downgrades of existing loans. With regard to regular loans, at regional banks, normal loans as well as loans to borrowers classified as "need attention" and below have increased, and at *shinkin* banks, loans to borrowers classified as "need attention excluding special attention" have increased slightly, while normal loans have decreased. Lastly, looking at the rate of change in loans compared with before the pandemic by industry shows that the increase in loans to face-to-face services industries (food, accommodation, and consumer services) has been pronounced (Chart IV-1-5). This likely reflects the fact that the face-to-face services industry is strongly affected by the pandemic. However, the share of loans to the face-to-face services industry in financial institutions' loan portfolios overall remains at only a little over 10 percent.

### 3. Firms' financial conditions since the outbreak of COVID-19

#### Large firms

Large firms' financing shows that, on the whole, many large firms perceive their financial position as "easy," and the DI of financial positions has improved to close to the level before the outbreak of COVID-19 (left panel of Chart IV-1-6). However, many firms in the face-to-face services industry, which has been severely affected by the pandemic, still regard their financial positions as "tight."

**Chart IV-1-6: DI of financial positions and sales changes by industry (large firms)**



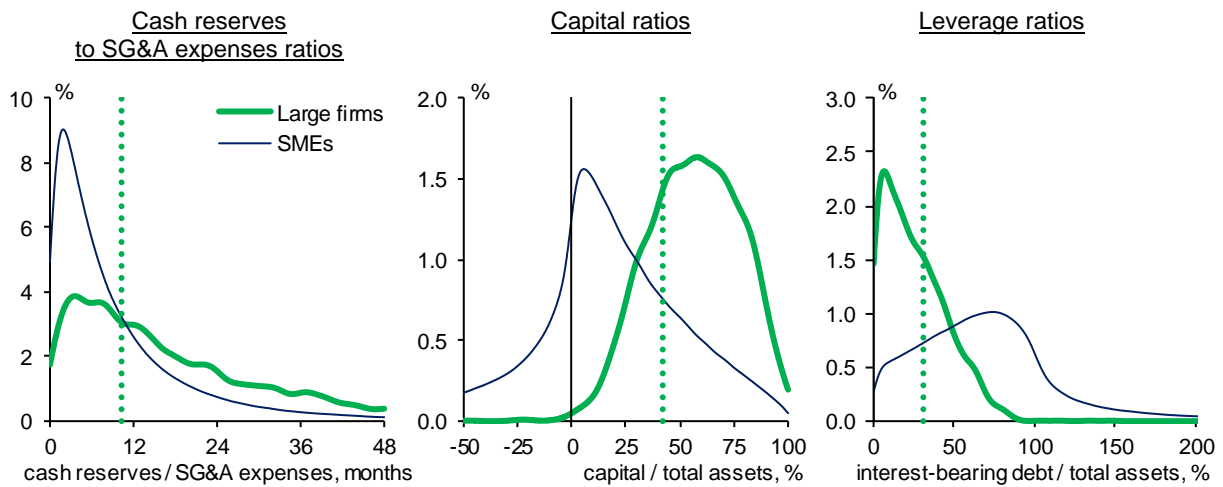
Note: 1. The figures for "Face-to-face services" in the left-hand chart are weighted averages by the number of firms that responded to the question in each industry.  
 2. The right-hand chart covers firms listed on the domestic stock exchanges. The data for fiscal 2021 indicate the forecasts.  
 3. In the right-hand chart, the solid lines indicate weighted averages. The bands indicate 10th-90th percentile points.  
 Source: Nikkei Inc., "NEEDS-Financial QUEST"; BOJ, "Tankan."

Moreover, examining sales forecasts for fiscal 2021 using the settlement reports of listed firms shows that, while sales are expected to recover to a level comparable to that seen in fiscal 2019

on an all-industries basis, those of firms in the transportation and postal services and face-to-face services industries are likely to remain considerably below the fiscal 2019 level (right panel of Chart IV-1-6).

Looking at firms' financial conditions, many large firms continue to hold ample liquidity and capital relative to SMEs, even in the wake of the outbreak of the pandemic (Chart IV-1-7). However, a large number of firms in the transportation and postal services and face-to-face services industries have been facing relatively severe funding conditions with sales that are expected to remain at low levels in the future. The amount of credit extended to individual large firms is often considerable and attention needs to be paid to the fact that a credit rating downgrade of an individual firm could have a substantial impact on financial institutions' credit costs.

**Chart IV-1-7: Cash reserves to SG&A expenses ratios, capital ratios and leverage ratios (end of FY2020)**



Note: 1. Cash reserves to SG&A expenses ratios are calculated as cash reserves (end of fiscal 2020) / SG&A expenses (fiscal 2020).

2. The vertical green dotted lines indicate the median for large firms in face-to-face services.

Source: CRD Association; Nikkei Inc., "NEEDS-Financial QUEST."

## SMEs

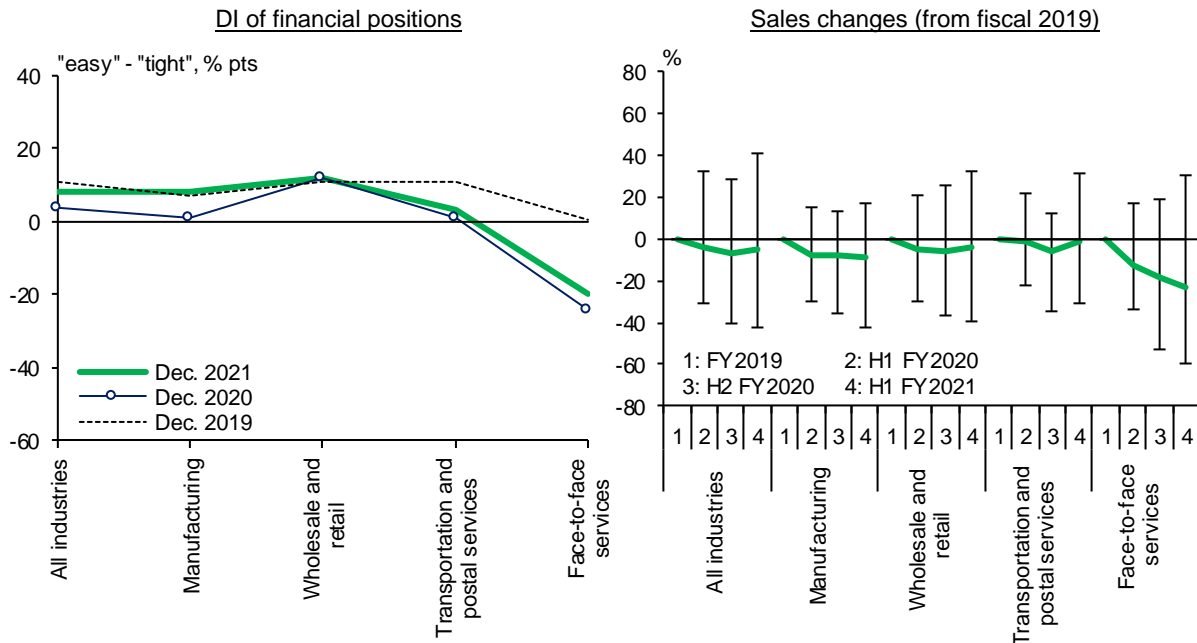
SMEs' financing overall has recovered to pre-pandemic levels; however, as with large firms, many SMEs in the face-to-face services industry still perceive their financial positions as "tight" (left panel of Chart IV-1-8). Moreover, even on an all-industries basis, SMEs' sales in fiscal 2021 have not recovered to the fiscal 2019 level, and the pace of recovery in the face-to-face services industry is below that for all industries (right panel of Chart IV-1-8).

Next, a look at changes in SMEs' financial conditions from fiscal 2020, when the pandemic started to spread, to the end of 2021 using macroeconomic data shows that, on an all-industries basis, cash reserves have increased as operating cash flows have recovered, suggesting that resilience in terms of financing has been maintained (left panel of Chart IV-1-9). It is also notable that, despite active funding, the amount remains smaller than the increase in cash reserves, suggesting that the resilience of SMEs as a whole in terms of the debt repayment capacity has not been significantly impaired. Meanwhile, regarding the face-to-face services industry, the operating cash flow has been positive, but is underpinned by cash payments and remains low compared to the level in fiscal 2019 (right panel of Chart IV-1-9). Further, although cash reserves in the face-to-face services industry have increased, as in other industries, this increase almost equals the amount of funding, suggesting that a fair number of SMEs in this industry may be more vulnerable in terms of debt repayment capacity than those on an all-industries basis.

IV. Risks faced by financial institutions

A. Domestic credit risk

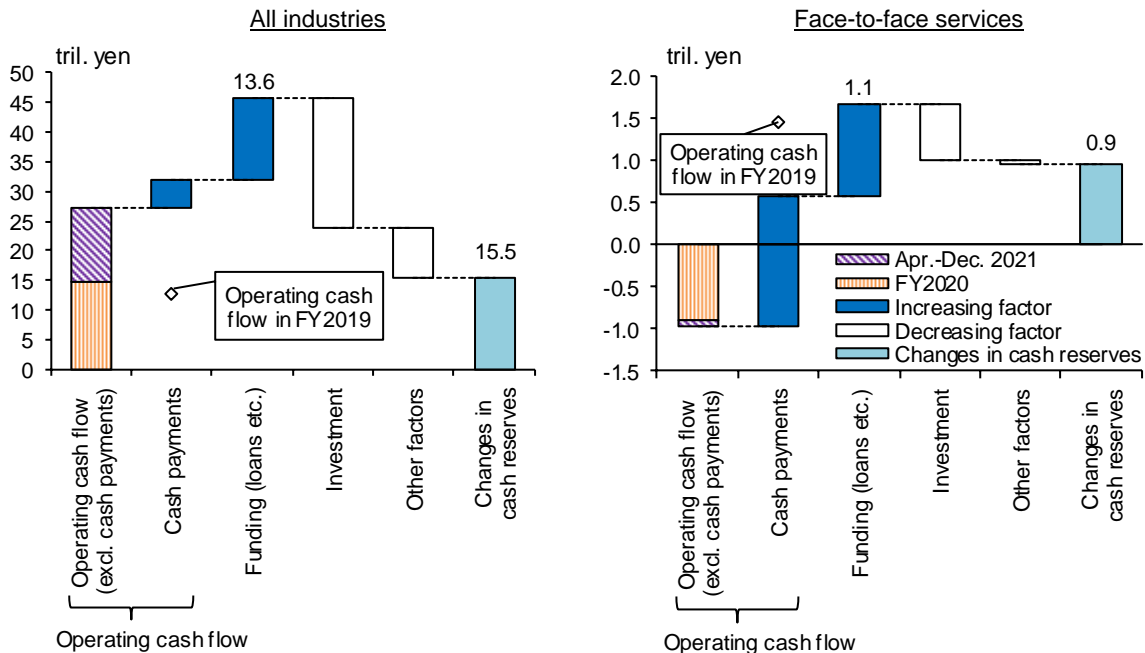
**Chart IV-1-8: DI of financial positions and sales changes by industry (SMEs)**



Note: 1. The figures for "Face-to-face services" in the left-hand chart are weighted averages by the number of firms that responded to the question in each industry.  
 2. In the right-hand chart, the solid lines indicate weighted averages. The bands indicate 10th-90th percentile points.  
 3. H1 (H2) in the right-hand chart represents financial results for the one-year period of firms whose accounting period ends in the first (second) half of the fiscal year, and not the half-yearly results.

Source: CRD Association; BOJ, "Tankan."

**Chart IV-1-9: Changes in cash reserves since the outbreak of COVID-19 (SMEs)**



Note: 1. Calculated based on the survey results from the April-June quarter of 2020 through the October-December quarter of 2021 by accumulating the changes in balance sheet items etc. in each survey term.  
 2. For simplicity, "Cash payments" is calculated as the changes in non-operating profits from the average figure before the outbreak of COVID-19. "Other factors" includes securities investment etc.

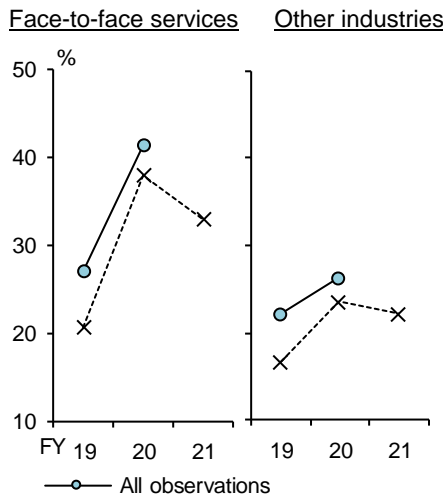
Source: Ministry of Finance, "Financial statements statistics of corporations by industry."

Moreover, examining changes in SMEs' financial conditions using firm-level data shows that, compared to fiscal 2019, the share of SMEs with a negative operating cash flow in fiscal 2020



(based on all observations) has increased by about 15 percentage points in the face-to-face services industry and by about 5 percentage points in all other industries (Chart IV-1-10).<sup>9</sup> Based on data available at the end of 2021, it is possible that a considerable number of SMEs may have a negative operating cash flow in fiscal 2021 as well.<sup>10</sup> SMEs' cash reserves have increased regardless of the size of their operating cash flow, indicating that stress in terms of financing may be relatively limited. However, especially among SMEs with a negative operating cash flow, the amount of funding is substantially larger than the increase in cash reserves, suggesting that some SMEs may be experiencing stress in terms of debt repayment capacity (Chart IV-1-11).

**Chart IV-1-10: Share of firms with negative operating cash flow (SMEs)**

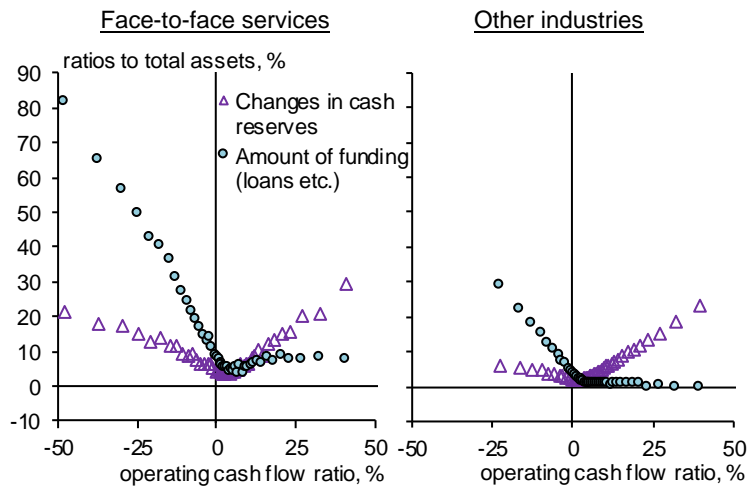


---x--- Ref. Continuing observations for w/hich financial results for fiscal 2021 are available

Note: For simplicity, operating cash flow is the sum of current profits and depreciation.

Source: CRD Association.

**Chart IV-1-11: Amount of funding and changes in cash reserves by operating cash flow (SMEs, FY 2020)**



Note: 1. Changes in cash reserves ratio = (cash reserves at the end of the fiscal year - cash reserves at the beginning of the fiscal year) / total assets at the beginning of the fiscal year.

Amount of funding ratio = (loans at the end of the fiscal year - loans at the beginning of the fiscal year) / total assets at the beginning of the fiscal year.

Operating cash flow ratio = operating cash flow / total assets at the beginning of the fiscal year.

2. Firms are grouped into 2-percentile bins based on their operating cash flow ratios. The dots represent the median values for each group. The top and bottom 4-percentile samples are excluded.

Source: CRD Association.

#### 4. Simulation analysis

Focusing on SMEs, this subsection presents a medium-term simulation reflecting economic conditions and developments, such as in measures to support corporate financing since the previous *Report*, to estimate firms' PD and financial institutions' credit cost ratio.<sup>11</sup>

<sup>9</sup> The firm-level data from the Credit Risk Database (CRD) of the CRD Association, which covers about 2.67 million SMEs that have transactions with private and government financial institutions as well as credit guarantee corporations, are used.

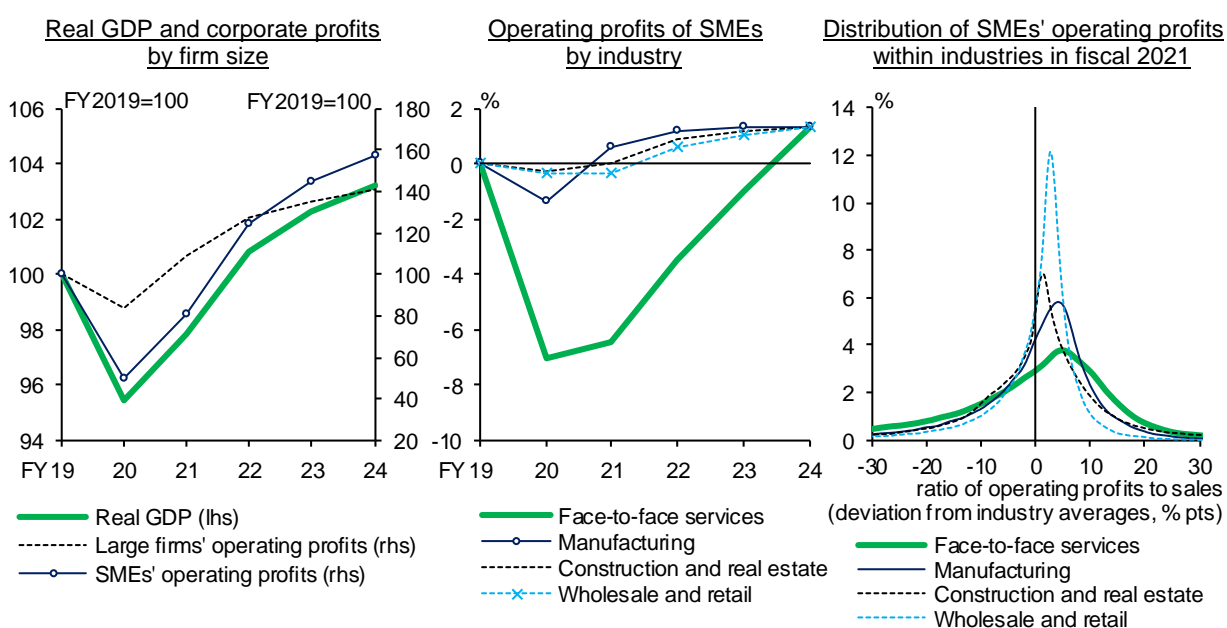
<sup>10</sup> The share of SMEs for which financial results for fiscal 2021 were available at the end of 2021 was only around 10 percent in the CRD.

<sup>11</sup> Among SMEs in the CRD, the simulation covers about 750 thousand SMEs, for which the data items necessary for the analysis are recorded.

a. Methodology and assumptions

The analysis is based on some assumptions about firms' future profits, investment, and finances. First, the aggregate corporate profits (operating profits, etc.) are estimated based on the assumption that they move in line with macroeconomic developments. Next, the corporate profits of large firms and SMEs and those of different industries as a whole are computed while ensuring consistency with the estimates of aggregate corporate profits and taking the heterogeneity of the impact of COVID-19 into account (left and middle panels of Chart IV-1-12).<sup>12</sup> The computed profits of SMEs in fiscal 2024 based on these assumptions exceed the level in fiscal 2019 in all industries. Individual firms' profits are computed using assumptions regarding the distribution of firm-level profitability across SMEs within the same industry (right panel of Chart IV-1-12).<sup>13</sup>

**Chart IV-1-12: Assumptions on GDP and corporate profits for medium-term simulation**



Note: The figures in the middle chart indicate changes in operating profits from fiscal 2019 as a percentage of sales in fiscal 2019.

Source: Japan Center for Economic Research, "ESP forecast"; Ministry of Finance, "Financial statements statistics of corporations by industry."

It is assumed that SMEs' investment activity in fiscal 2021 and beyond is restrained and their investments equal the amount of capital depreciation. As for firms' financing activity, it is assumed

<sup>12</sup> Regarding the operating profits of each firm size group, the actual level of operating profits through the third quarter of fiscal 2021 (from April through December 2021) is used as the starting point, and the estimated overall profits for firms of all sizes in each period are proportionally allocated based on sales in fiscal 2019 to obtain the estimated future profits for each firm size group. Moreover, with regard to the operating profits of SMEs in each industry, the actual level of operating profits through the third quarter of fiscal 2021 (from April through December 2021) is again used as the starting point, and it is assumed that the gap across industries gradually narrows through fiscal 2024.

<sup>13</sup> The future operating profits of individual firms are set using the actual level of operating profits in fiscal 2020 as the starting point and the estimated operating profits at the industry level for each year, where the latter values are allocated to each firm using its actual sales in fiscal 2019 and the distribution of profits across firms within its industry. Firm-level data show that the heterogeneity in operating profits across firms within an industry increased substantially in fiscal 2020 and then was more or less unchanged at around the same level in fiscal 2021. In the simulation analysis, the heterogeneity in profits is assumed to decrease slightly in fiscal 2022 and be unchanged in the following years.

that firms gradually adjust the level of cash reserves built up for precautionary purposes when the pandemic spread, so that by the end of fiscal 2024 it equals the level as of the end of fiscal 2019.<sup>14</sup>

Regarding the government's measures to support corporate financing, it is assumed that in fiscal 2020 firms used effectively interest-free loans rather than regular loans without public guarantee from private financial institutions, and that the grace period for principal, the repayment period, and the interest subsidy period of effectively interest-free loans are one year, five years, and three years, respectively. Thus, it is assumed that firms gradually start repaying effectively interest-free loans from fiscal 2021 and making interest payments from fiscal 2023 onward. Moreover, support measures such as the employment adjustment subsidies program and cooperation fees for shortening business hours have been in place, and business revival support payments have been newly introduced (Chart IV-1-13). Using data on government expenses, these support measures are also taken into account in the current analysis.<sup>15</sup> However, the analysis does not incorporate government contingency funds for COVID-19 for which the purpose has not yet been decided as of the end of February 2022, or the possibility that cash payments will be granted from government budgets for fiscal 2023 and beyond.

**Chart IV-1-13: Assumption on major measures to support corporate financing for medium-term simulation**

	Assumptions for calculating amounts of each firm's subsidies and borrowing	Fiscal expenses and total size of measures	Assumptions for total amounts of cash payments	
			FY2021	FY2022
Expansion of employment adjustment subsidies program	Each eligible firm receives the amount proportional to the product of their rate of sales decrease and labor costs. The amount is received from firms with a larger rate of sales decrease from fiscal 2019 in order until the total amount reaches the fiscal spending for SMEs, which is estimated by the BOJ.	6.1 tril. yen	2.4 tril. yen	0.6 tril. yen
Cooperation fees for shortening business hours	Each eligible firm in the food services industry receives the amount calculated by multiplying sales during fiscal 2019 by 0.4 and 9/12, which is assumed to be equivalent to the cooperation fees from April to October 2021 and from January to February 2022 (up to 0.1 mil. yen per store per day). The number of stores is estimated by using average sales per store. The amount is received from firms with a larger rate of sales decrease from fiscal 2019 in fiscal 2021 in order until the total amount reaches the estimated fiscal spending for SMEs.	5.1 tril. yen	5.4 tril. yen	
One-off support payments and monthly support payments	Each eligible firm belonging to industries such as accommodation receives the amount equivalent to the decrease in sales during fiscal 2021 from fiscal 2019 multiplied by 7/12, which is assumed to be equivalent to the support payments from April to October 2021 (up to 0.2 mil. yen per month). The amount is received from firms with a larger rate of sales decrease from fiscal 2019 in fiscal 2021 in order until the total amount reaches the estimated fiscal spending for SMEs.	0.7 tril. yen	0.7 tril. yen	
Business revival support payments	Each eligible firm receives the amount equivalent to the decrease in sales during fiscal 2021 from fiscal 2019 multiplied by 5/12 up to the maximum amount depending on firm size (up to 2.5 mil. yen). The amount is received from firms with a larger rate of sales decrease from fiscal 2019 in fiscal 2021 in order until the total amount reaches the estimated fiscal spending for SMEs.	2.8 tril. yen	2.8 tril. yen	
Effectively interest-free loans	Every firm borrows the amount required to meet the assumption on its cash reserve even after it receives the above cash payments (up to 60 mil. yen).	110 tril. yen		

Note: Assumptions for total amounts of cash payments are estimated using information such as actual payment amounts and budget amounts as of the end of February 2022. Regarding cooperation fees for shortening business hours, the fiscal expense indicates the amount granted for local public entities, whereas the assumption for the total amount indicates the estimated amount granted for firms based on the assumption that local public entities bear 20 percent of the total amount.

Source: Cabinet Office; Financial Services Agency; Ministry of Economy, Trade and Industry; Ministry of Finance; Ministry of Health, Labour and Welfare.

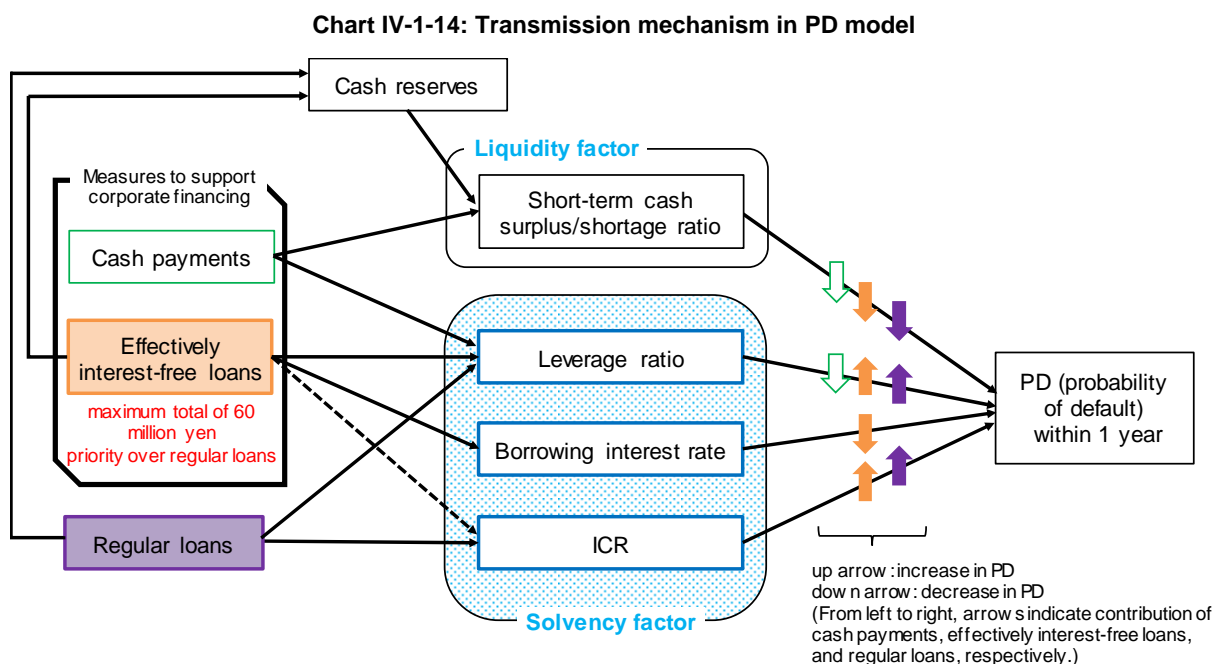
<sup>14</sup> It is assumed that, if cash reserves fall below the precautionary level due to a decline in operating cash flows, firms take out regular loans; on the other hand, if cash reserves exceed the precautionary level, firms reduce the outstanding amount of loans.

<sup>15</sup> Specifically, using the Economic Census for Business Activity and the Unincorporated Enterprise Survey to measure the number of firms of each size, etc., the total amount of cash payments to SMEs is estimated based on actual government expenses. SMEs are then ordered in terms of their estimated percentage decline in sales (from largest to smallest), and it is assumed that SMEs receive cash benefits in that order up to the total estimated amount of cash payments to them.

b. Simulation results

*Firms' probability of default*

Under these assumptions, the PD model employed in the previous issues of the *Report* is used to assess medium-term developments in firms' PD.<sup>16</sup> In the simulation, the PD is defined as the probability that a firm within one year is downgraded to a borrower classification of "special attention" or below, becomes delinquent for three months or longer, or is subject to subrogation by a credit guarantee corporation. In this model, when firms' operating cash flow decreases, their liquidity deteriorates through a decrease in cash reserves and their creditworthiness worsens through a decline in the ICR, increasing the PD (Chart IV-1-14).<sup>17</sup> Moreover, the PD essentially decreases when firms' cash reserves increase due to various measures to support corporate financing, such as cash payments and loan programs, that have been implemented to date. Of such measures, cash payments in a specific year have the effect of pushing down the PD in that year and beyond through a reduction in firms' financial leverage. An increase in borrowing in a specific year pushes up the PD in the subsequent years through an increase in leverage and a decrease in debt repayment capacity. Meanwhile, the use of effectively interest-free loans has the same effect as that of increasing borrowing, and based on the assumption that interest subsidies on such loans are provided for three years, this temporarily helps lower the PD but then contributes to a higher PD through an increase in interest payments from fiscal 2023.



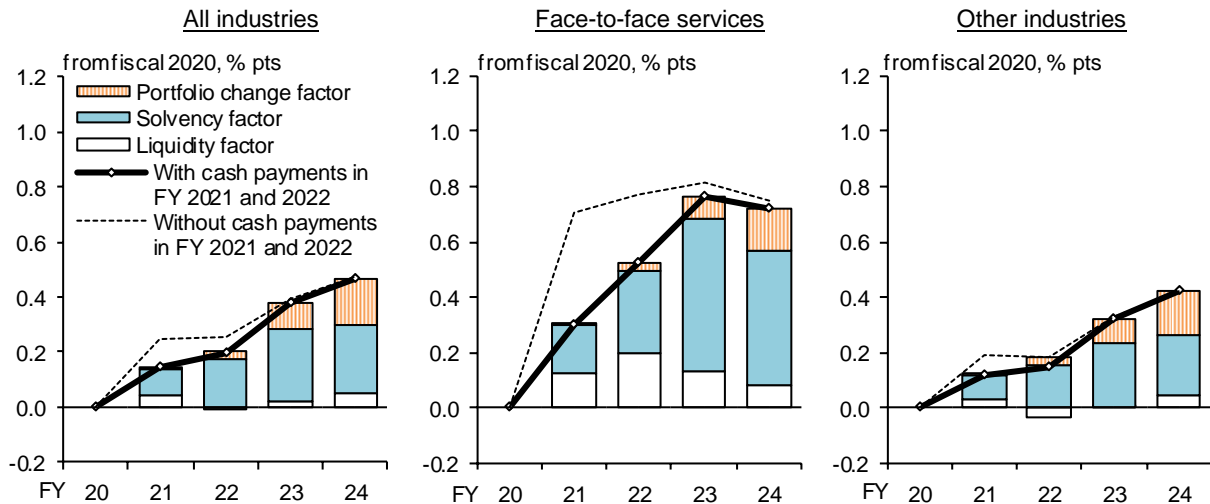
The estimation shows that, assuming that the heterogeneity in profits across industries and firms remains, borrowing to compensate for the decline in cash reserves increases from fiscal 2021,

<sup>16</sup> The PD model is estimated using whether a firm defaults (within one year) as the dependent variable and the short-term cash surplus/shortage ratio, which is the sum of their cash reserves at the beginning of the fiscal year and their operating cash flow, the leverage ratio, the borrowing interest rate, and the interest coverage ratio (ICR) as explanatory variables. In addition, the contribution of the cash surplus/shortage ratio to changes in the PD is categorized as the contribution of changes in liquidity, while the contributions of the leverage ratio, the borrowing interest rate, and the ICR are categorized as the contribution of changes in solvency.

<sup>17</sup> In this simulation, for simplicity, cash payments are incorporated into current profits. Operating cash flow is the sum of current profits (including cash payments) and depreciation.

particularly among firms that face a decline in their operating cash flow. In addition, interest payments on effectively interest-free loans increase from fiscal 2023. As a result, mainly due to changes in firms' creditworthiness, the overall PD of SMEs increases slightly in fiscal 2021 and beyond from the low, restrained level in fiscal 2020 (left panel of Chart IV-1-15).<sup>18,19,20</sup>

**Chart IV-1-15: Decomposition of the changes in PD (all industries and by industry)**



Assuming that the pace of recovery in the face-to-face services industry overall is moderate, both liquidity and solvency factors push up the PD to a greater degree than in other industries, since firms take out more loans to offset the decline in cash reserves resulting from a negative operating cash flow and other factors (middle panel of Chart IV-1-15). In industries other than the face-to-face services industry, the rise in the PD remains small, partly because firms reduce loans outstanding on the back of a recovery in corporate profits (right panel of Chart IV-1-15).

Lastly, the share of defaulting firms from fiscal 2021 onward is calculated using estimates of the PD.<sup>21</sup> In doing so, it is assumed that no firms are newly added to financial institutions' credit portfolios in fiscal 2021 and beyond.<sup>22</sup> The calculation suggests that, although the share of defaulting firms for all industries increases gradually, the increase is limited and the share remains

<sup>18</sup> As pointed out in the previous issues of the *Report*, PDs in fiscal 2020 are considered to have been reduced significantly by the various measures to support corporate financing relative to what they would have been in the absence of those measures.

<sup>19</sup> In order to show the impact of the pandemic on PDs, the previous issue of the *Report* presented the simulation results as the difference between the estimated PD for which the impact of the pandemic is incorporated and the estimated alternative PD that would have prevailed if there had been no pandemic (i.e., profits were unchanged in fiscal 2020, there was no precautionary borrowing, etc.). For this issue of the *Report*, the level of PD itself is estimated such that it can be used to calculate financial institutions' credit cost ratio, and the results are shown as the difference in the PD vis-à-vis the level in fiscal 2020.

<sup>20</sup> Changes in financial institutions' credit portfolios also affect the PDs. Under the assumption that heterogeneities in the extent to which firms are affected by the pandemic remain in fiscal 2021 and beyond, firms in a relatively healthy financial position gradually repay existing loans and drop out of financial institutions' credit portfolios, leading to an increase in the average PD of firms that remain in the portfolios. In fiscal 2023 and 2024, such portfolio change factor contributes to a higher PD quite considerably, and excluding this factor, the PD would increase by only around 15 basis points from fiscal 2021.

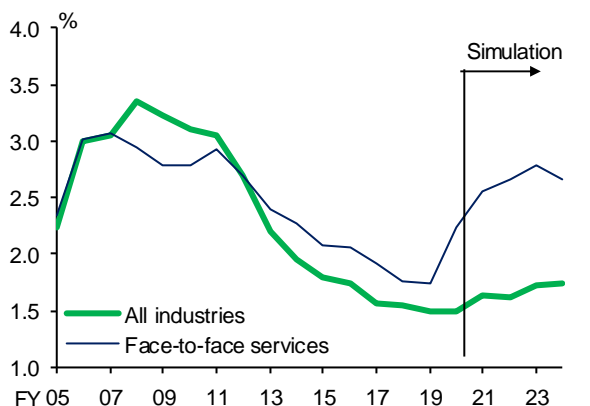
<sup>21</sup> In measuring the share of defaulting firms, a random number that follows the uniform distribution, ranging from 0 to 1, is assigned to each SME, and the firm is assumed to default if that number falls below the estimated PD of that firm.

<sup>22</sup> From a long-term perspective, firms that are newly added to credit portfolios tend to have a stronger financial base than existing firms. Taking this into account, the share of defaulting firms estimated here may be higher than the actual level.

IV. Risks faced by financial institutions  
A. Domestic credit risk

at a low level in fiscal 2024 because firms generally have fairly ample cash reserves, mainly on the back of the measures to support corporate financing. However, in the face-to-face services industry, the share increases further through fiscal 2023 from the current level based on the assumption that the recovery in profits is more moderate than in other industries and heterogeneity across firms continues to be substantial (Chart IV-1-16).

**Chart IV-1-16: Developments in the share of firms in default**



Note: The share of firms in default is calculated as the number of firms in default during the fiscal year divided by the number of existing firms at the beginning of the fiscal year.

Source: CRD Association.

**Chart IV-1-17: Calculation procedure of credit costs**

Firms	Probability of default ( $p$ )	Determination of defaulting firms	Credit amount (Regular loans)
1	$p_1$	x	1 billion yen
2	$p_2$	x	5 billion yen
3	$p_3$	x	2 billion yen
4	$p_4$	o (defaulting)	3 billion yen
5	$p_5$	x	10 billion yen
6	$p_6$	o (defaulting)	5 billion yen
7	$p_7$	x	3 billion yen
8	$p_8$	o (defaulting)	2 billion yen
⋮	⋮	⋮	⋮
Total credit amount (regular loans) of defaulting firms			50 billion yen
Credit costs (losses) = credit amount x the uncovered ratio x (1 - the recovery rate)			8 billion yen = 50 bil. yen x 0.4 x 0.4

*Financial institutions' credit cost ratio*

Next, financial institutions' credit cost ratio for their SME loan portfolios is calculated using the estimates of individual firms' PD obtained in the simulation analysis.<sup>23</sup> Specifically, the calculation consists of the following two steps (Chart IV-1-17):

- (1) For fiscal 2021, defaulting firms among firms that existed in fiscal 2020 are selected probabilistically based on their PD. Similarly, for fiscal 2022, defaulting firms among the remaining firms are selected based on their PD. This process is repeated up to fiscal 2024. The uncovered and uncollectible portion of loans to firms identified as defaulting in this process are then counted as financial institutions' credit costs.<sup>24</sup>
- (2) The previous step is repeated for a large number of patterns in terms of which firms default, and the average of the credit costs of these iterations is then calculated.<sup>25</sup> This average value is then divided by the total amount of loans outstanding to obtain an estimate of

<sup>23</sup> This approach is called the "default mode" approach. One other commonly used approach is "mark-to-market." In the latter approach, credit costs are measured by combining the data on the probability of borrowers transitioning from one borrower classification to another with the data on loan-loss provision ratios for each borrower classification. In the macro stress testing in Chapter V, credit costs are calculated using the mark-to-market approach. For details, see "The Financial Macro-econometric Model (FMM, March-2020 Version): Overview and Recent Developments," *Financial System Report Annex Series*, August 2020.

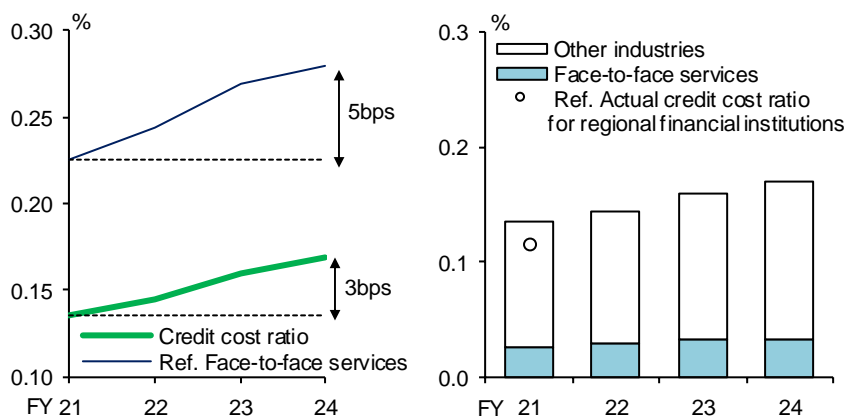
<sup>24</sup> In this estimate, the coverage ratio -- the ratio of loans covered by collateral and guarantees -- is assumed to be approximately 60 percent of the most recent actual figures for regional financial institutions, and the recovery rate for uncovered loans, due to data constraints, is assumed to be 60 percent based on the parameters of the standard internal ratings-based approach for calculating credit risk.

<sup>25</sup> Specifically, the simulation to determine which firms default is repeated 5,000 times and the average of the simulated credit costs is used.

financial institutions' credit cost ratio. This second step is needed to obtain a robust figure because which firms are selected as defaulting firms depends on probability and financial institutions' credit costs greatly depend on which firms default given that the amount of loans outstanding differs from firm to firm.

A look at the estimated credit cost ratio shows that the ratio increases through fiscal 2024 against the backdrop of a rise in firms' PD (Chart IV-1-18). However, the increase is contained, partly due to the active use of effectively interest-free loans and the relatively small share of loans to the severely pandemic-affected face-to-face services industry in financial institutions' loan portfolios overall.<sup>26</sup> That said, because the simulations make a number of assumptions, the quantitative results of the analysis should be treated with some caution.<sup>27</sup>

**Chart IV-1-18: Financial institutions' credit cost ratios (loan portfolios to SMEs)**



- Note: 1. "Face-to-face services" in the left-hand chart indicates the credit cost ratio regarding credit portfolios to the face-to-face services industry.  
 2. The marker in the right-hand chart indicates the average of actual credit cost ratios over the last three years for regional financial institutions (the latest data for regional banks are annualized values for the first half of fiscal 2021).  
 3. The loan coverage ratio is calculated as the latest value of regional financial institutions (about 60 percent). The recovery rate for uncovered loans is assumed to be 60 percent.

Source: BOJ.

## 5. Assessment based on the analysis

The above analysis indicates that, although the overall PD of SMEs could increase slightly in the medium term, it is expected to remain at a fairly low level compared to the level during the GFC. Financial institutions' credit cost ratio is also likely to remain at a low level despite the expected rise going forward.

It should be noted, however, that the results depend on various assumptions underlying the analysis regarding developments in corporate profits at the macro-level, firms' investment and financing behavior, heterogeneity in corporate profits across industries and firms, etc. If the recovery in corporate profits is delayed substantially going forward due to the growing impact of

<sup>26</sup> Although the industry composition of loans in the CRD database used in the simulation differs slightly from values in Chart IV-1-5, where the industry composition of loans to SMEs is shown, it is similar in that the share of loans to the face-to-face services industry is also just over 10 percent.

<sup>27</sup> It should be noted that this approach does not consider changes in credit costs caused by the addition or reversal of loan-loss provisions resulting from downgrades or upgrades other than those due to defaults. It should also be noted that the estimates do not consider possible entering of new firms to financial institutions' loan portfolios from fiscal 2021 to fiscal 2024. If, for example, firms with relatively robust financial bases were newly added to loan portfolios, financial institutions' credit cost ratio might have been pushed down.

IV. Risks faced by financial institutions  
 B. Overseas credit risk

the pandemic and the continued rise in raw material prices, firms' PD and financial institutions' credit cost ratio may rise in the medium term. Financial institutions will need to take this into account, assess the sustainability of borrower firms' business, provide effective support tailored to borrowers' needs, and manage credit risks appropriately.

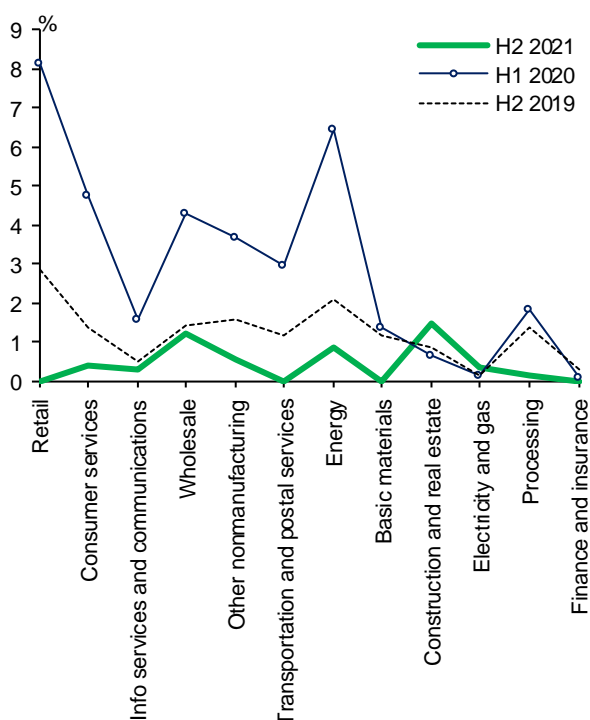
## B. Overseas credit risk

The quality of Japanese banks' overseas loan portfolios has remained high on the whole as the deterioration in the quality of loan portfolios seen in some industries due to the pandemic has come to a halt. The global economy has recovered on the whole, albeit with variations across countries and regions, and firms' creditworthiness is improving. However, overseas loan portfolios continue to warrant attention in terms of credit management, since the quality of some portfolios has deteriorated compared with before the pandemic.

### Overseas credit risk

Looking at corporate bond default rates abroad by industry, they have declined to a level below pre-pandemic levels on the whole (Chart IV-2-1). On an all-industries basis, the downgrade rate from investment grade (IG) to non-investment grade (non-IG) and the default rate of non-IG corporate bonds are now clearly below the historical average level (Chart IV-2-2). Thus, with the economy recovering, firms' creditworthiness has been improving.

**Chart IV-2-1: Default rates of corporate bonds by industry**

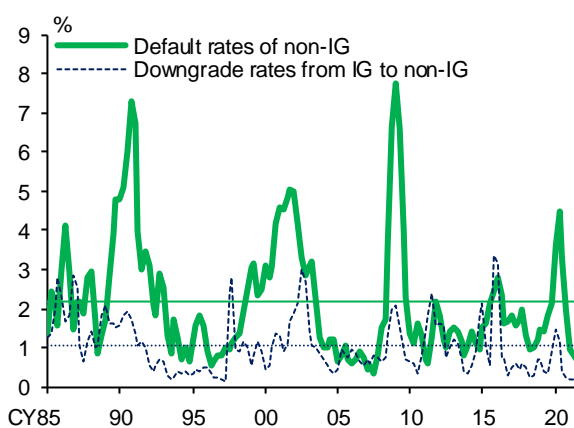


Note: 1. Default rates are on the issuer basis, including bond and loan issuers.

2. Energy covers oil and natural gas development.

Source: Moody's.

**Chart IV-2-2: Default rates of corporate bonds**



Note: 1. Default rates and downgrade rates are calculated quarterly for each 2-quarter long window on the issuer basis, including bond and loan issuers. Latest data as at July-December of 2021.

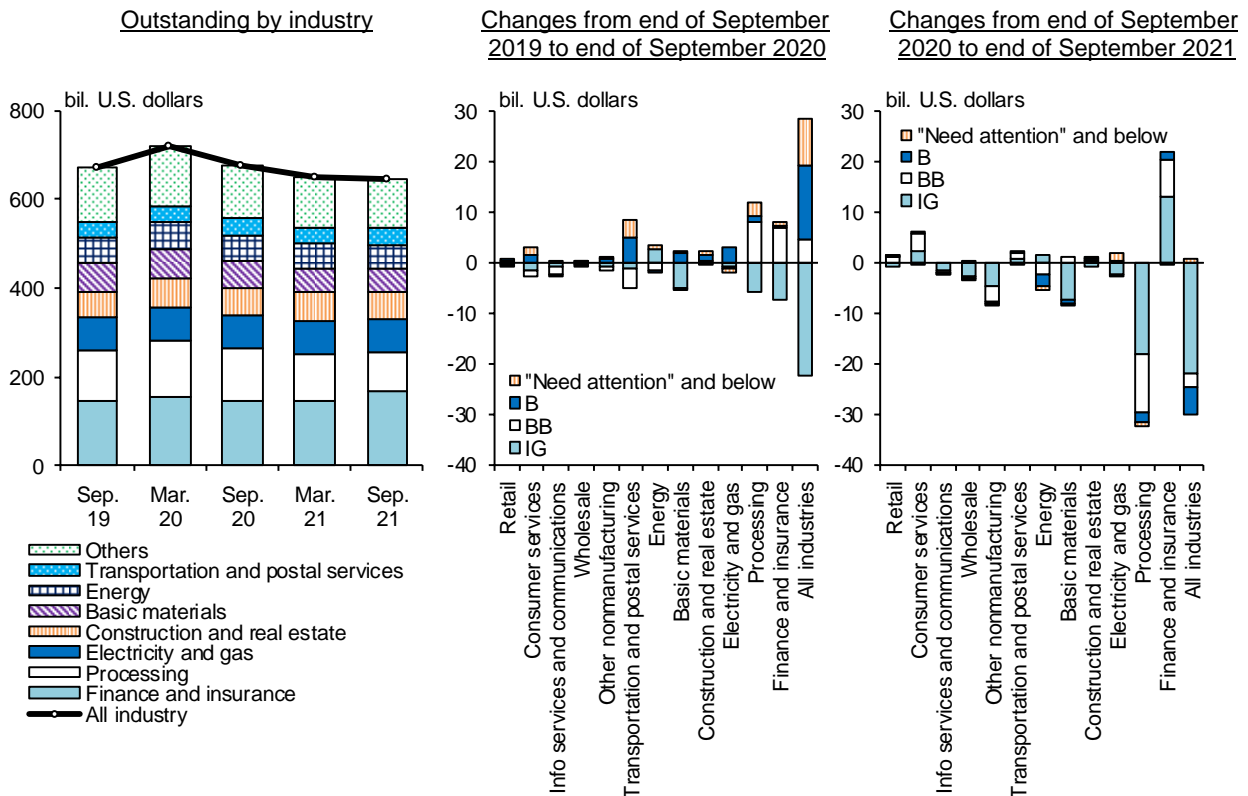
2. The thin solid line and the thin dotted line indicate the historical averages of default rates and downgrade rates, respectively.

Source: Moody's.



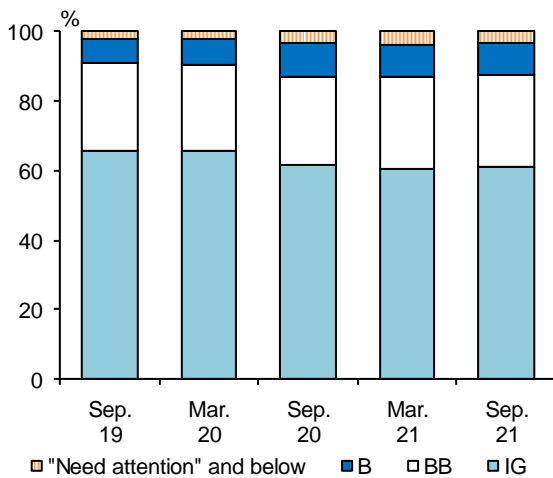
Next, developments in Japanese banks' overseas loans by industry are examined.<sup>28</sup> Loans outstanding, after having increased in response to the spread of COVID-19, have declined, particularly to firms in the processing industry (Chart IV-2-3). Looking at the rating composition, although the rise in the share of non-IG loans due to the pandemic has paused, the share has remained somewhat high compared with the level seen before the pandemic (Chart IV-2-4).

**Chart IV-2-3: Overseas corporate loans outstanding (by industry)**



Note: 1. Covers the three major banks' lending.  
 2. Energy covers oil and natural gas development.  
 3. Based on internal rating of each banks.  
 Source: BOJ.

**Chart IV-2-4: Rating composition of overseas corporate loans**

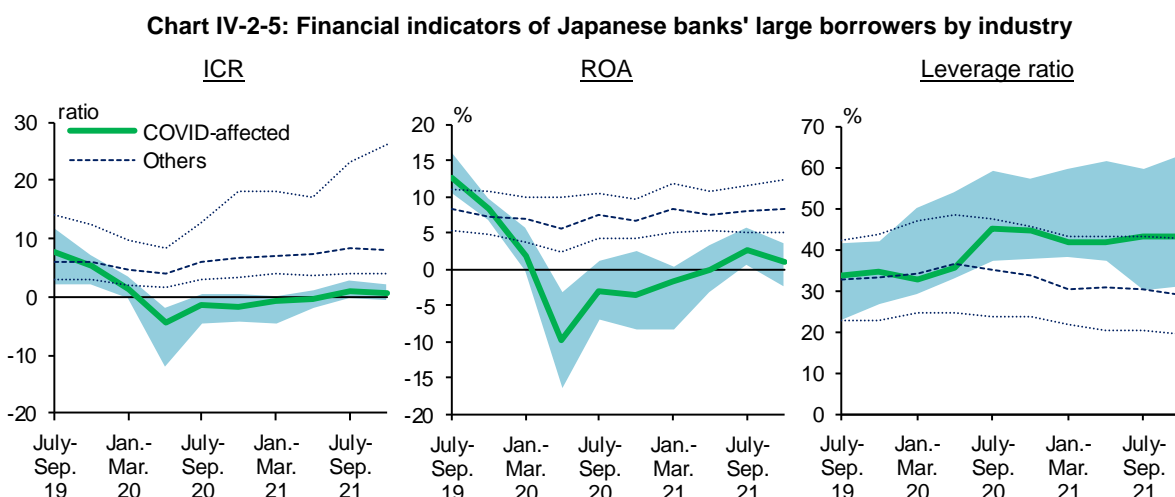


Note: 1. Covers the three major banks' lending.  
 2. Based on internal rating of each banks.  
 Source: BOJ.

<sup>28</sup> Loan portfolios here include those for project and object finance, which have relatively low ratings.

### Financial conditions of large overseas borrowers

Comparing large overseas borrowers in "COVID-affected industries" -- industries that are considered to be strongly affected by the pandemic (transportation and postal services as well as consumer services) -- with large overseas borrowers in all other industries shows that, although the ICR and ROA for "COVID-affected industries" have improved compared with the level immediately after the outbreak of the pandemic, they remain below those for other industries, and the leverage ratio of "COVID-affected industries" has remained at a high level (Chart IV-2-5).<sup>29</sup> Although the share of Japanese banks' overseas loans to these industries -- at 8.6 percent as of September 2021 -- is relatively small, future developments warrant close attention.



Note: 1. Covers the three major banks. "COVID-affected" includes transportation and postal services and consumer services. Latest data as of October-December 2021.  
 2. ICR is measured as EBITDA / interest expenses, ROA as EBITDA / total assets, and leverage ratio as interest bearing debt / total assets.  
 3. The shaded areas and the thin dotted lines indicate the 25th-75th percentile ranges for "COVID-affected" and "Others," respectively.  
 Source: S&P Global Market Intelligence; BOJ.

### Changes in global economic and financial conditions and firms' creditworthiness

This subsection uses credit rating data for about 5,000 overseas firms to estimate the impact of three global risk factors -- a rise in U.S. interest rates, a widespread deterioration in financial conditions, and a rise in crude oil prices -- on firms' creditworthiness and compares their impacts on the loan portfolios of Japanese and U.S. banks.

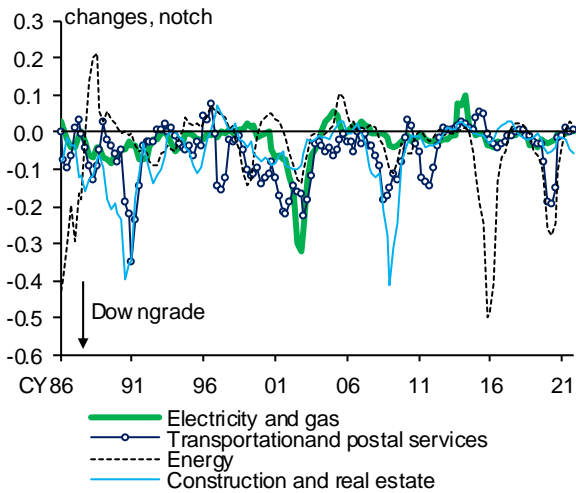
To start with, time series for changes in rating by industry show that, whereas ratings in the electricity and gas industry have been stable, ratings in other industries tend to fluctuate substantially, and the industries in which ratings fluctuate substantially also differ from period to period. Moreover, looking at IG firms and non-IG firms separately indicates that the ratings of non-IG firms are more volatile than those of IG firms (Charts IV-2-6 and IV-2-7).

Next, the impact of the above three risk factors on firms' PD is estimated.<sup>30</sup> First, regarding the response to a rise in the three-month U.S. interest rate by industry, a statistically significant increase in the PD in the finance and insurance industry and the construction and real estate

<sup>29</sup> Large overseas borrowers are defined as the largest overseas borrowers (business corporations), in terms of the loan amount outstanding, in each region and rating category of the three major banks.

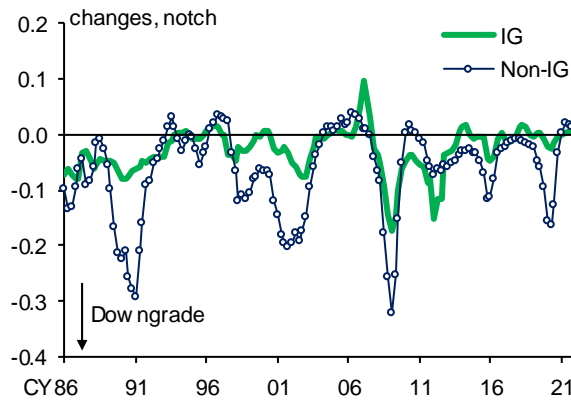
<sup>30</sup> For PDs, the forward two-year cumulative PD for each rating category published by Moody's is used.

**Chart IV-2-6: Changes in ratings by industry**



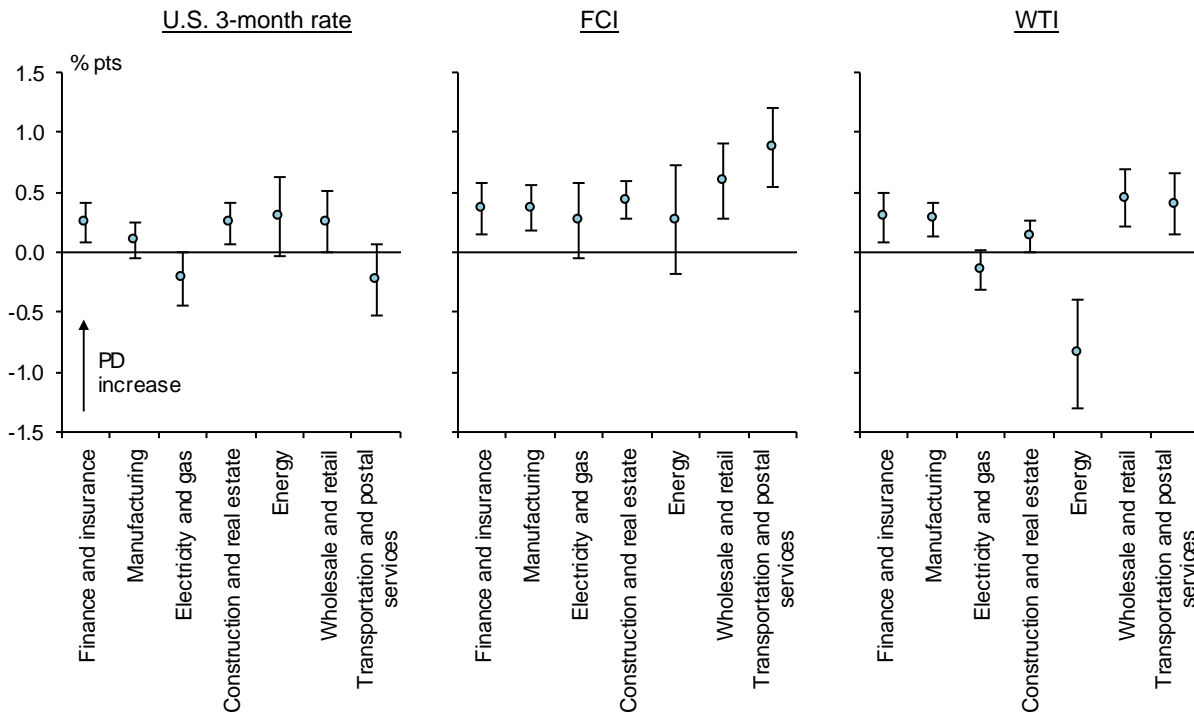
Note: 1. The chart shows the average changes in ratings per quarter by industry.  
 2. 3-quarter centered moving average. Latest data as at October-December 2021.  
 Source: Moody's.

**Chart IV-2-7: Changes in ratings for IG and non-IG issuers**



Note: 1. The chart shows the average changes in ratings per quarter for IG and non-IG issuers.  
 2. 3-quarter centered moving average. Latest data as at October-December 2021.  
 Source: Moody's.

**Chart IV-2-8: Changes in global risk factors and probability of default by industry**

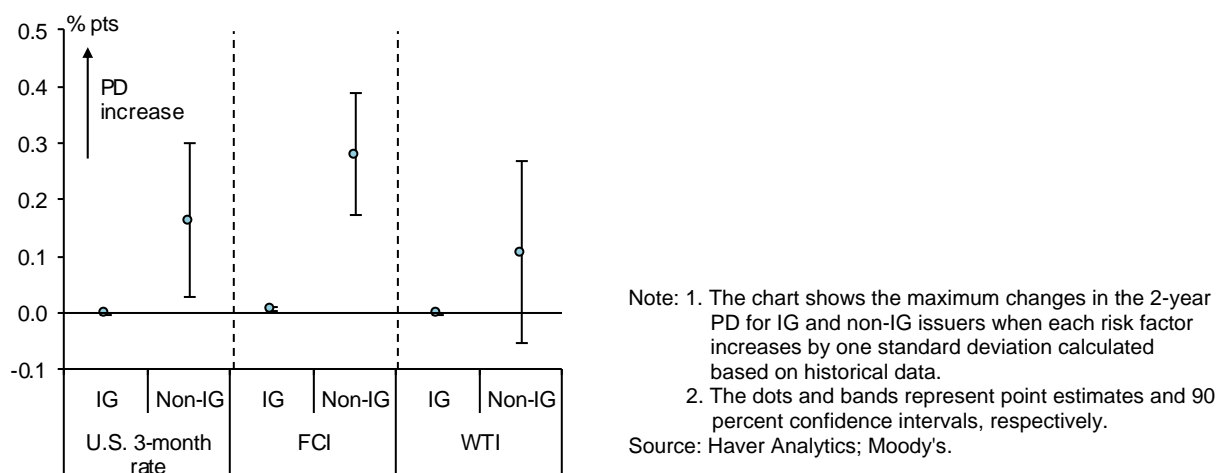


Note: 1. The chart shows changes in the 2-year PD for non-IG issuers by industry when each risk factor increases by one standard deviation calculated based on historical data.  
 2. The dots and bands represent point estimates and 90 percent confidence intervals, respectively.  
 3. The maximum changes in the 2-year PD are estimated as follows: (1) controlling for U.S. macroeconomic factors, the average changes in ratings by industry are estimated using local projections for up to eight quarters with respect to quarter-on-quarter changes in each risk factor, and (2) the maximum changes in the 2-year PD are then estimated as the product of the maximum changes during the estimation period and changes in the PD if ratings changed by one notch. The same applies to Charts IV-2-9 and IV-2-11.  
 4. The estimation period is from the January-March quarter of 1985 to the October-December quarter of 2019 for the U.S. 3-month rate, from the April-June quarter of 1990 to the October-December quarter of 2019 for the FCI, and from the April-June quarter of 1986 to the October-December quarter of 2019 for the WTI prices. However, in all cases, the period of the Global Financial Crisis period (July 2008 - June 2009) is excluded. Observations consist of issuers worldwide excluding Japan. The same applies to Charts IV-2-9 and IV-2-11.  
 5. A one standard deviation for each risk factor corresponds to 0.42 percentage points for the U.S. 3-month rate, 0.24 points for the FCI, and 14.10 percent for WTI prices. The same applies to Charts IV-2-9 and IV-2-11.

Source: Haver Analytics; Moody's.

IV. Risks faced by financial institutions  
 B. Overseas credit risk

**Chart IV-2-9: Changes in global risk factors and probability of default by rating**



industry is seen. Moreover, in response to a widespread deterioration in financial conditions, represented as an increase in the financial conditions index (FCI), the PD increases in a wide range of industries, particularly in transportation and postal services.<sup>31</sup> On the other hand, there is heterogeneity across industries regarding how firms respond to a rise in crude oil prices: while the PD in the energy industry decreases, it increases in other industries (Chart IV-2-8). Lastly, looking at IG and non-IG firms separately shows that, in response to a rise in either of the three risk factors, the PD of non-IG firms increases while the PD of non-IG firms does not change (Chart IV-2-9).

Further, the characteristics of Japanese banks' overseas loan portfolios are compared to those of major U.S. commercial banks.<sup>32</sup> A look at the industry composition of loan portfolios shows that the energy industry and the electricity and gas industry make up larger shares of the loan portfolios of Japanese banks than major U.S. commercial banks while the construction and real estate industry makes up a smaller share. In terms of the rating composition, the share of IG loans is lower in the portfolios of Japanese banks than that of major U.S. commercial banks (Chart IV-2-10).<sup>33</sup>

When decomposing differences in the impact of the three risk factors on the PDs in the loan portfolios of Japanese banks and major U.S. commercial banks into the contribution of differences in the industry composition and the rating composition of loan portfolios, the following is found: With regard to the impact of a rise in U.S. interest rates and crude oil prices, the industry composition of Japanese banks' loan portfolios works to mitigate the deterioration in PDs relative to their U.S. counterparts. On the other hand, the rating composition of Japanese banks' loan portfolios is inferior to that of major U.S. commercial banks, which further increases the PD. This result suggests that the contributions of the industry composition and the rating composition offset each other, so that the impact of these two risk factors on the PDs in the loan portfolios of Japanese banks and major U.S. commercial banks does not differ that much (see Box 3 for a discussion on the impact

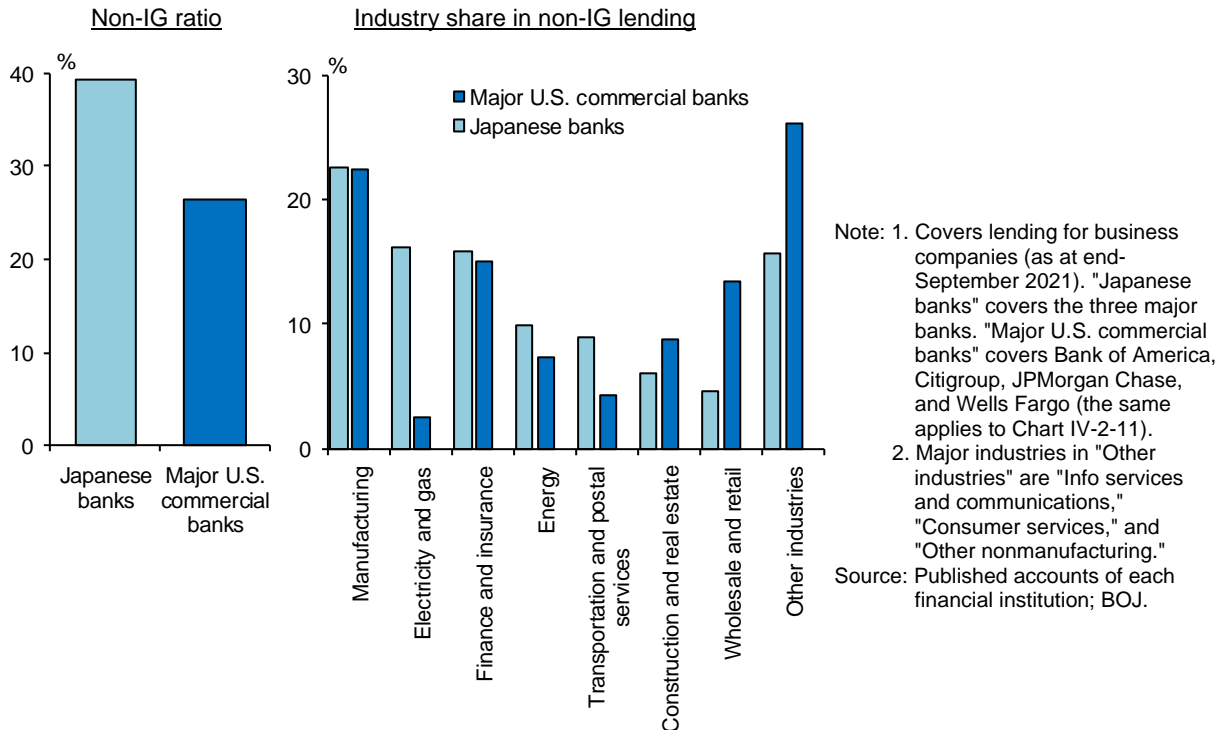
<sup>31</sup> Specifically, the FCI (Chicago Fed National Financial Conditions Index) calculated by the Federal Reserve Bank of Chicago, which is constructed from variables such as the volatility index (VIX) and credit spreads on corporate bonds, is used.

<sup>32</sup> Major U.S. commercial banks here consist of the following four U.S. global systemically important banks (G-SIBs) that earn a large amount of profits from commercial banking: Bank of America, Citigroup, JPMorgan Chase, and Wells Fargo. As with the case for Japanese banks, loan portfolios subject to this analysis include project and object finance.

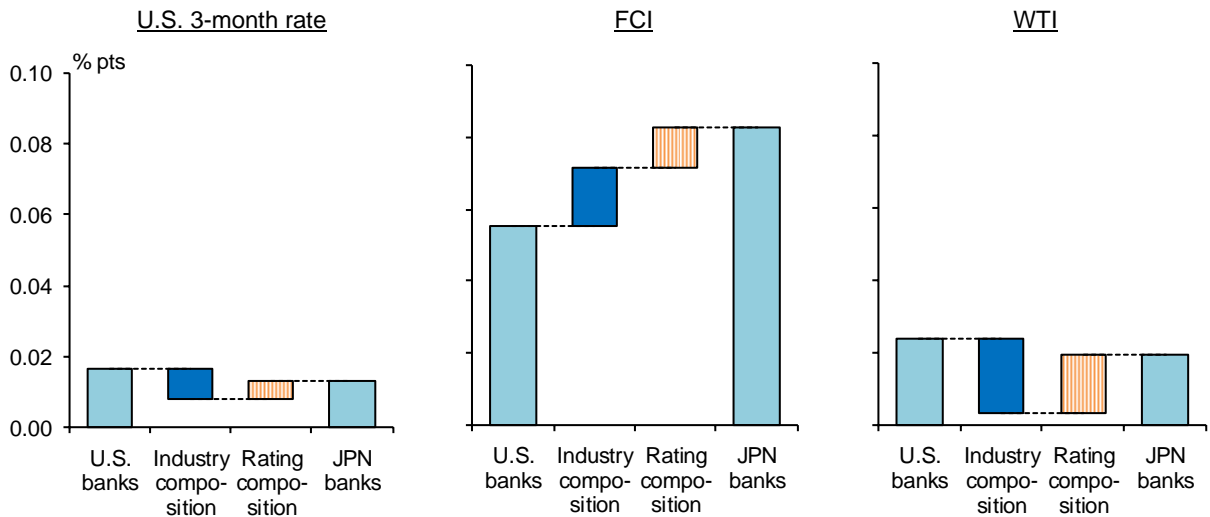
<sup>33</sup> For a broader portfolio comparison including European banks, see Chart IV-2-6 in the October 2020 issue of the Report.

of rising U.S. interest rates on the deposit-lending margins of Japanese banks).<sup>34</sup> In contrast, a widespread deterioration in financial conditions may have a greater impact on the PDs in Japanese banks' portfolios through both the rating and the industry composition (Chart IV-2-11).

**Chart IV-2-10: Composition of overseas loans for Japanese and major U.S. commercial banks**



**Chart IV-2-11: Sensitivity of Japanese and U.S. banks' loan portfolio PDs with respect to global risk factors**



Note: 1. The chart shows the percentage point increase in the PDs in U.S. and Japanese banks' loan portfolios in response to one standard deviation increase in each risk factor calculated based on historical data. Increases in the PD in banks' portfolios are calculated as the weighted averages of PD increases by industry and investment grade, using the composition of U.S. and Japanese banks' loan portfolios (as at end-September 2021) as weights.  
2. When calculating the increases in the PDs in U.S. and Japanese banks' loan portfolios, the PD increases in the seven industries shown in Chart IV-2-10, and in four other industries, i.e. "Other nonmanufacturing," "Info services and communication," "Consumer services," and "Other industries" are used.  
Source: Moody's; Published accounts of each financial institution; BOJ.

<sup>34</sup> This comparison is based on the point estimates of the response of PDs for each industry and rating, i.e., IG or non-IG, weighted by the amount of loans outstanding and therefore needs to be interpreted with some degree of latitude.

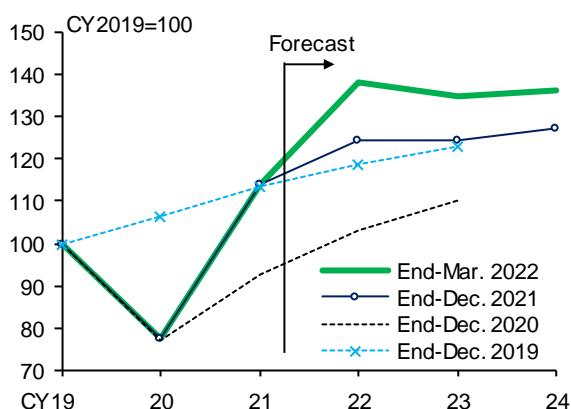
IV. Risks faced by financial institutions  
 B. Overseas credit risk

These estimation results suggest that the industry composition of Japanese banks' portfolios may make the portfolios less susceptible to the potential adverse impact should global risk factors materialize. However, the fact that the share of non-IG loans in the total overseas loans of Japanese banks has risen somewhat compared to before the pandemic may make the portfolios more susceptible should such risks materialize. In particular, attention should be paid to the fact that non-IG firms generally have a large amount of debt at floating interest rates and debt repayment burden tends to increase during periods of interest rate rises. Given that Japanese banks have recently been focusing on expanding their business in the non-IG area to improve the profitability of their overseas operations, it is also important to note that Japanese banks may become even more susceptible to such risks if they increase lending to lower-rated borrowers.

*Project finance loans and object finance loans*

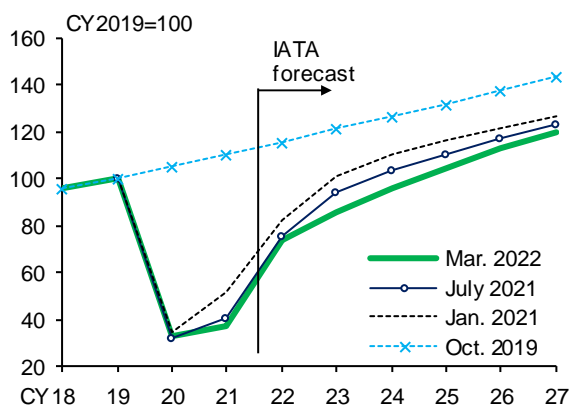
Next, energy-related loans, which account for the major part of project finance loans, are examined. As shown in the above analysis, the creditworthiness of energy-related firms tends to worsen when crude oil prices fall, meaning that developments in crude oil prices need to be monitored closely. While crude oil prices are currently rising and markets have revised profit forecasts upward for energy firms, it has been pointed out that, from a long-term perspective, there is a risk of significant price adjustments due to a decline in crude oil demand in a situation where countries accelerate their shift toward a carbon-neutral economy, and therefore attention is warranted (Chart IV-2-12).

**Chart IV-2-12: Profit forecasts of energy industry**



Note: Companies are limited to those for which EBITDA forecasts are available as of each forecast date.  
 Source: S&P Global Market Intelligence.

**Chart IV-2-13: Forecasts of demand for air transportation**



Note: Revenue passenger kilometers. Values up to the previous year of each forecast are actual values.  
 Source: IATA/Tourism Economics, "Air Passenger Forecasts."

Lastly, aircraft financing loans, which account for a large share of object finance loans, are examined. Global air passenger demand experienced a significant decrease in 2020 due to the spread of COVID-19 (Chart IV-2-13). There remains high uncertainty over future developments as

the forecasts for passenger demand have been revised downward from the July 2021 forecasts. Going forward, it is important to keep a close eye on the possibility that the creditworthiness of aircraft-related object finance loans may be affected through, for example, lower aircraft prices and a decline in lease payments as a result of downward pressure on aviation demand and heightened geopolitical risks.

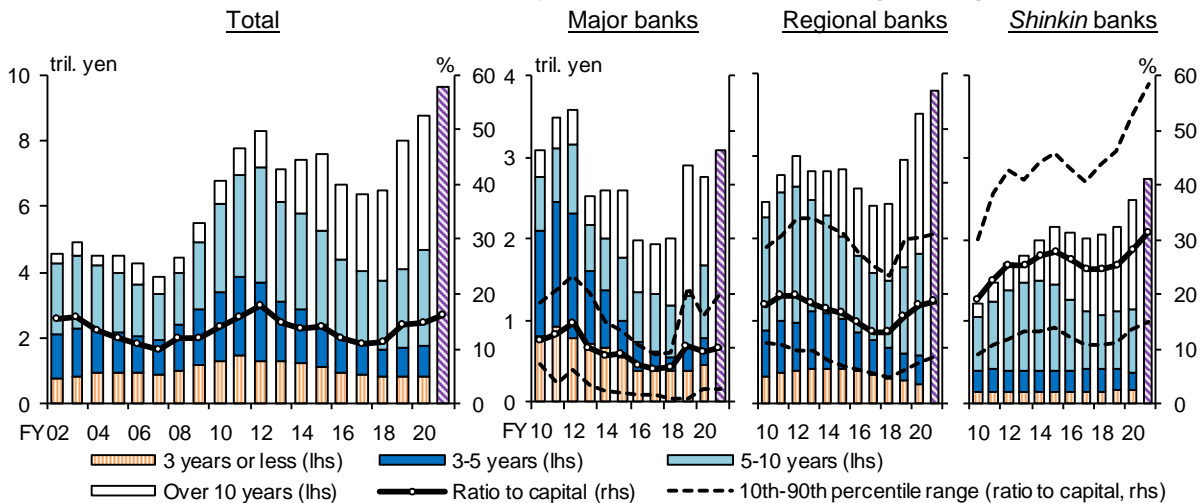
### C. Market risk associated with securities investment

Japanese financial institutions have been actively investing in securities such as overseas credit products and investment trusts under the prolonged low interest rate environment. Since the outbreak of the pandemic, they have increased yen-denominated bond investments, partly reflecting the rise in deposit inflows against the backdrop of the increase in fiscal spending, and the substantial improvement in market conditions has had an impact on their investment stance with regard to investment trusts and overseas credit products. Amid expectations for a reduction in the degree of monetary easing in the United States and Europe and reflecting the situation in Ukraine, some financial institutions have recently reduced their investment positions, such as their foreign securities positions. Against this background, this section examines the market risks associated with financial institutions' securities investment.

#### Yen interest rate risk

The amount of interest rate risk associated with the yen-denominated bond investments of financial institutions has reached the highest level since records began in fiscal 2002 (Chart IV-3-1).<sup>35</sup> The increase in the amount of risk is attributable to (1) the lengthening of the duration of bond portfolios that regional financial institutions in particular are undertaking for the purpose of compensating for

**Chart IV-3-1: Interest rate risk associated with yen-denominated bondholdings among financial institutions**



Note: 1. Interest rate risk is a 100 basis point value in the banking book. Convexity and higher order terms are taken into account. The data for fiscal 2021 are estimated as at end-February 2022.  
 2. Capital represents common equity Tier 1 (CET1) capital for internationally active banks from fiscal 2012 onward, core capital for domestic banks from fiscal 2013 onward, and Tier 1 capital for internationally active banks and domestic banks before fiscal 2012 and fiscal 2013, respectively (excluding the transitional arrangements related to the Basel III framework). Unless otherwise noted, subsequent charts are based on the same definition.

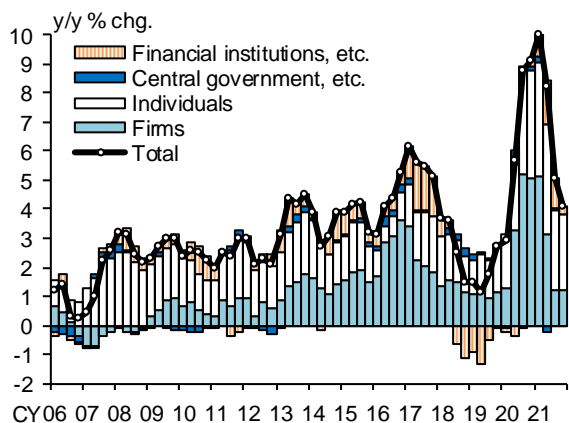
Source: BOJ.

<sup>35</sup> In Chart IV-3-1, changes in the economic value of bondholdings are calculated assuming a parallel shift in the yield curve in which the interest rates for all maturities rise by 1 percentage point. One of the interest rate risk scenarios assumed in the FSA's public notice about interest rate risk in the banking book (IRRBB) employs an upward parallel shift of 1 percentage point.

IV. Risks faced by financial institutions  
 C. Market risk associated with securities investment

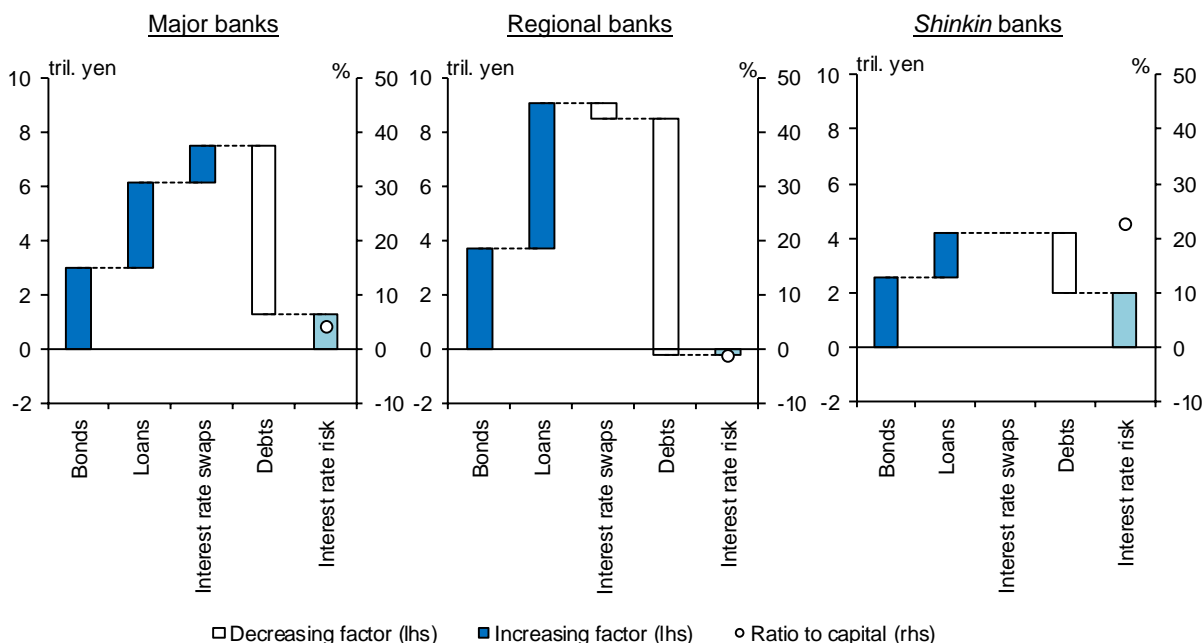
the decline in profits from high-coupon bonds, of which these institutions held large amounts and which had reached redemption, and (2) a rise in the outstanding amount of bond investments at all types of financial institutions since the start of the pandemic, partly due to the increase in the inflow of deposits against the backdrop of increased fiscal spending (Charts III-1-19 and IV-3-2). Looking at the ratio of the amount of interest rate risk associated with yen-denominated bond investments to the amount of capital, this ratio has risen to around 10 percent for major banks, around 20 percent for regional banks, and around 30 percent for *shinkin* banks. As for regional banks and *shinkin* banks, the dispersion in the ratio across financial institutions has been increasing to a fair degree since the pandemic.

Chart IV-3-2: Deposits outstanding by type of depositor



Note: 1. Covers domestically licensed banks. "Financial institutions, etc." includes NCDs.  
 2. Latest data as at the October-December quarter of 2021.  
 Source: BOJ.

Chart IV-3-3: Yen interest rate risk among financial institutions



Note: Interest rate risk is a 100 basis point value in the banking book. Convexity and higher order terms, and so-called "core deposits" in debts are taken into account. For major banks and regional banks, off-balance-sheet transactions (interest rate swaps) are included. The data for major banks are as at end-December 2021, and those for regional banks and *shinkin* banks are as at end-September 2021.  
 Source: BOJ.

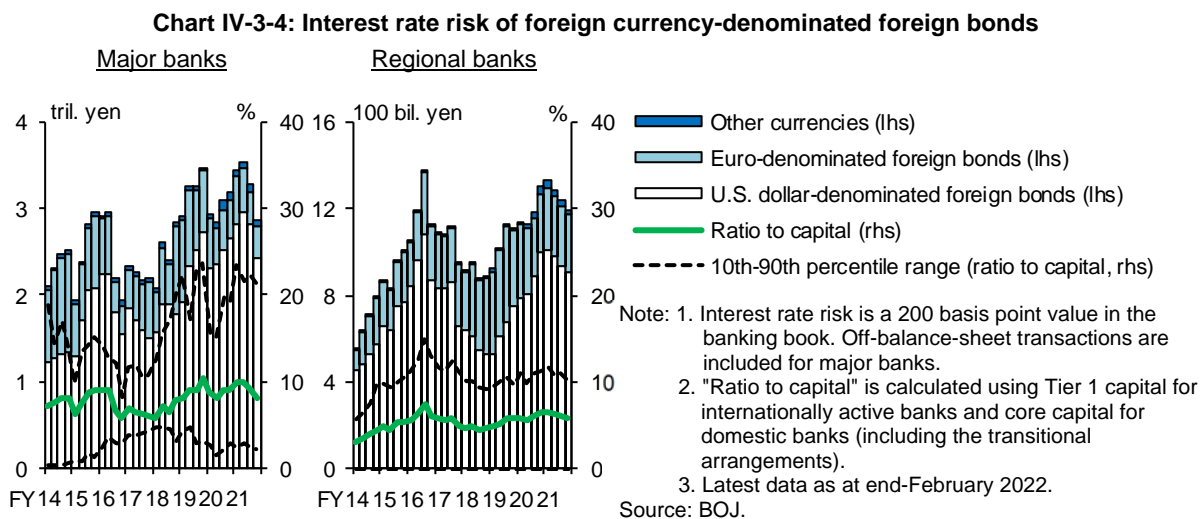
If, similarly to normal deposits, part of the recent increase in deposits is regarded as an increase in sticky core deposits, the yen interest rate risk in the entire banking book may be considered as



smaller than otherwise would be the case (Chart IV-3-3).<sup>36</sup> However, attention should continue to be paid to uncertainty regarding the stickiness of the deposits that have flowed in due to the recent increase in fiscal spending.

### Foreign currency interest rate risk

The amount of interest rate risk associated with foreign currency-denominated bond investments for major banks has decreased slightly due to a reduction in their foreign currency-denominated bond positions amid expectations for a reduction in the degree of U.S. monetary easing. Meanwhile, regional banks have seen limited increases in the amount outstanding of foreign-currency-denominated bond holdings in anticipation of a rise in interest rates. The ratio of the amount of interest rate risk associated with foreign currency-denominated bonds to the amount of capital generally has been limited to about 10 percent for major banks and 5 percent for regional banks (Chart IV-3-4).<sup>37</sup> As for regional financial institutions, overseas fixed income investment trusts as well as multi-asset investment trusts, for which overseas interest rate risk is the main risk factor, account for about 50 percent of their investment trust holdings (Chart III-1-22). Thus, attention needs to be paid to the continued importance for regional financial institutions to manage their foreign currency interest rate risk, including that associated with investment trusts.



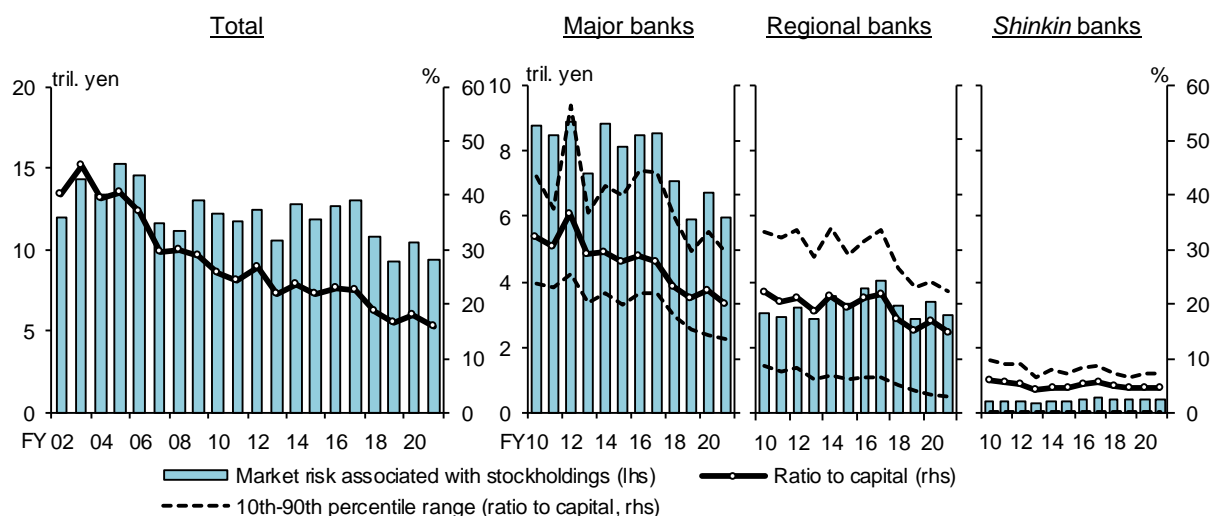
<sup>36</sup> In Chart IV-3-3, changes in the economic value of all assets and liabilities are calculated assuming a parallel shift in the yield curve in which the interest rates for all maturities rise by 1 percentage point. When the average remaining maturity of assets is longer than that of liabilities, a widening maturity mismatch (the difference between the average maturity of assets and liabilities) will amplify the interest rate risk. The estimation of changes in value here reflects only the risk associated with yen-denominated assets (loans and bonds) and liabilities as well as yen interest rate swaps (yen interest rate swaps held by *shinkin* banks are not taken into account). When calculating the interest rate risk based on the assumption that core deposits have increased, the interest rate risk in the overall banking book will be smaller since the economic value of liabilities in the event of a rise in interest rates becomes smaller as the remaining maturity of liabilities becomes longer.

<sup>37</sup> The FSA's public notice with regard to IRRBB sets an upward parallel shift as one of the scenarios for calculating interest rate risk, assuming the changes in the interest rates of the U.S. dollar and the euro are both 2 percentage points. Similarly, the interest rate risk of foreign currency-denominated foreign bonds in Chart IV-3-4 is calculated as the change in the economic value of bondholdings assuming a parallel shift in the yield curve in which interest rates for all maturities increase by 2 percentage points.

### Market risk associated with stockholdings

Financial institutions have continued to decrease their strategic stockholdings (Chart IV-3-5).<sup>38</sup> The ratio of the amount of market risk associated with stockholdings to the amount of capital has been around 20 percent both for major banks and regional banks. Market risk associated with stockholdings thus remains at a level that is large enough to have a substantial impact on financial institutions' profits and financial soundness. Financial institutions need to continue to make an objective assessment of the purpose and costs of strategic stockholdings and control their exposure to the market risk associated with stockholdings, including strategic stockholdings, within an appropriate range according to their financial soundness.

**Chart IV-3-5: Market risk associated with stockholdings among financial institutions**



Note: 1. "Market risk associated with stockholdings" is value-at-risk with a 99 percent confidence level and a 1-year holding period, and excludes risk associated with foreign currency-denominated stockholdings.  
 2. The data for fiscal 2021 are estimated using the outstanding amount of stockholdings as at end-February 2022 and stock prices up to end-February 2022.

Source: BOJ.

### Risk associated with overseas credit product investment

On the whole, overseas credit product portfolios are managed cautiously against risks, with the outstanding amount of overseas credit products held by Japanese financial institutions declining slightly of late (Charts III-1-24 and III-1-25). In terms of the quality of leveraged loans, which are the assets underlying CLOs, the default rate overall has declined recently, although it had risen temporarily after the pandemic, and there have been no significant changes in measures of overcollateralization or interest coverage. Thus, the creditworthiness of CLOs with high credit ratings appears to be generally stable.

However, as some large financial institutions are planning to increase their investment in overseas credit products and alternative investment, there is a risk that major adjustments in overseas credit markets could lead to large losses for Japanese financial institutions.<sup>39</sup> Financial institutions engaged in overseas credit product investment need to make efforts to continuously improve their

<sup>38</sup> In Chart IV-3-5, the market risk associated with stockholdings is calculated using VaR with a 99 percent confidence level and a 1-year holding period. Volatility is calculated based on the observed data of the past five years.

<sup>39</sup> For details, see Box 2 in the October 2019 issue of the *Report*.

risk management by appropriately examining the overall functioning of overseas credit markets while taking into account developments in their own foreign currency funding liquidity, such as the degree of dependence on market funding.<sup>40</sup>

### *Other market risk including that associated with investment trust holdings*

In recent years, regional financial institutions in particular have actively increased the weight of investment trusts in their securities investment portfolios. Recently, they have been investing in investment trusts incorporating a wide range of risks, such as risks related to interest rates, stocks, credit, real estate, and foreign exchange (Chart III-1-22).

In particular, holdings of multi-asset investment trusts, for which overseas interest rate risk is the main risk factor, have continued to increase. Multi-asset investment trusts essentially aim to enhance returns by rebalancing their portfolios while controlling the risk of price declines within a certain range. Some of these trusts change their asset allocation at a high frequency in response to market changes, making it difficult for financial institutions to gauge and measure changes in the amount of risk in a timely manner. In addition, there were some cases in which multi-asset investment trusts were not always successful in diversifying risks in times of stress accompanied by large market volatility.

When financial institutions invest in investment trusts designed in such manner, they should fully understand their risk profiles and continue to improve their risk management frameworks by quantifying and closely monitoring the risk associated with each risk factor, as well as make practical and organizational plans for contingency responses in the event of significant losses.<sup>41</sup>

### *Growing importance of non-bank financial intermediaries*

Since the GFC, the importance of NBFIs entities, such as investment funds, in financial intermediation activities in international financial markets has been growing as a trend (Chart IV-3-6). As pointed out in previous issues of the *Report*, interlinkages between the domestic and international financial systems may have increased through, for example, overseas securities investment by Japanese financial institutions and investment in Japan by NBFIs entities, such as investment funds (Chart IV-3-7).<sup>42</sup> Looking at the overlap in the securities portfolios of individual Japanese financial institutions and investment funds, measured by the correlation of the market values of the portfolios, the number of financial institutions for which the degree of overlap has become higher compared with before the GFC has increased. As seen in the previous *Report*, the higher a financial institution's degree of overlap, the larger the decline in the market value of its securities portfolio tends to be at times of stress, such as the market turmoil in March 2020.<sup>43</sup> This suggests that the market risk faced by financial institutions is amplified not only by their investment

<sup>40</sup> For more on the current situation and challenges regarding Japanese financial institutions' risk management frameworks for overseas credit product investment, see Financial System and Bank Examination Department of the Bank of Japan and Supervision Bureau of the Financial Services Agency, "Developments in Overseas Credit Investment and Lending by Japanese Financial Institutions: An Overview Based on the Joint Survey by the Bank of Japan and the Financial Services Agency," *Bank of Japan Review Series*, no. 20-E-2, June 2020.

<sup>41</sup> For a discussion of issues regional financial institutions need to consider in the risk management of their investment trust investments, see "Regional Financial Institutions' Balance Sheet Management in the COVID-19 Era," *Financial System Report Annex Series*, January 2022 (available only in Japanese).

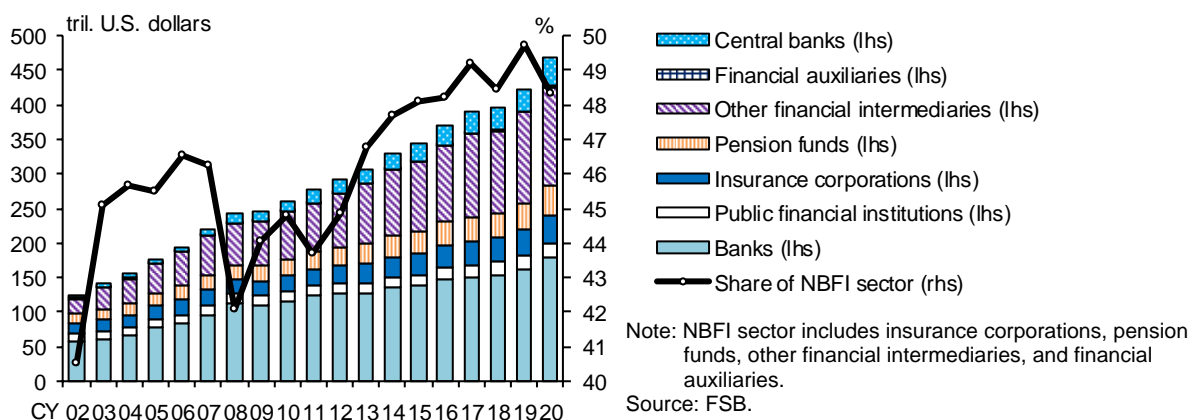
<sup>42</sup> The "interlinkage effect" refers to the effect that asset price fluctuations are amplified through transactions among different entities. This effect consists mainly of the "degree of portfolio overlap," the "portfolio adjustment rate," and the "degree of price impact." For details, see Box 5 in the April 2021 issue of the *Report*.

<sup>43</sup> For details, see Section C of Chapter IV in the October 2021 issue of the *Report*.

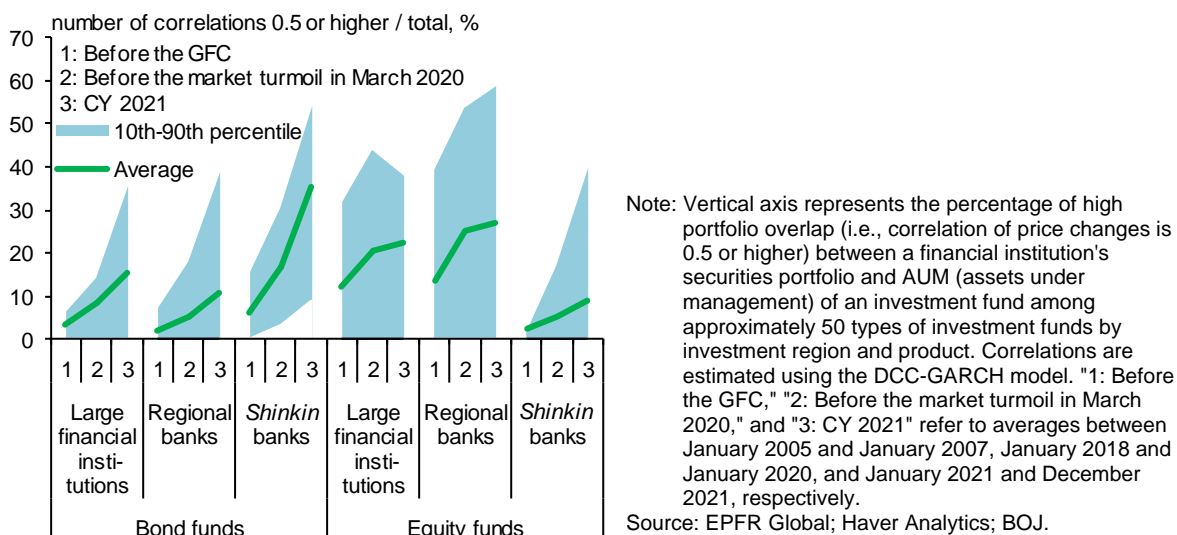
IV. Risks faced by financial institutions  
D. Foreign currency funding risk

behavior but also by the activities of NBFIs, and that the impact of the behavior of NBFIs may extend over wide areas of the financial system.

**Chart IV-3-6: Total global financial assets**



**Chart IV-3-7: Portfolio overlap with investment funds**



**D. Foreign currency funding risk**

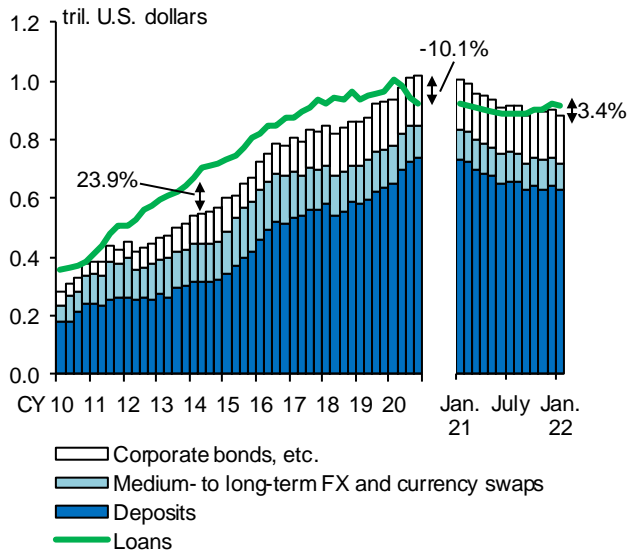
Looking at major banks' foreign currency balance sheets, the outstanding amount of loans (=assets) has generally been in line with that of stable funding such as deposits and corporate bonds (=liabilities), and thus the "stability gap," which is the difference between the two, has been around zero (Chart IV-4-1).

A more detailed look at developments since 2021 shows that, while loans started to pick up from mid-2021, deposits have followed a downward trend, and thus the stability gap, which had been in negative territory, narrowed and has recently been around zero (Charts III-1-16 and III-1-17). Looking at the breakdown of changes in deposits, among deposits that increased following the start of the pandemic, demand deposits -- which are considered to be relatively sticky -- were flat, whereas time deposits declined (Chart IV-4-2).

The decline in time deposits is due to the fact that banks are setting their interest rates on deposits, which they attracted at a high cost in the past, with a greater focus on profitability. With a gradual departure from the accommodative funding conditions, primarily due to a rise in U.S. interest rates,

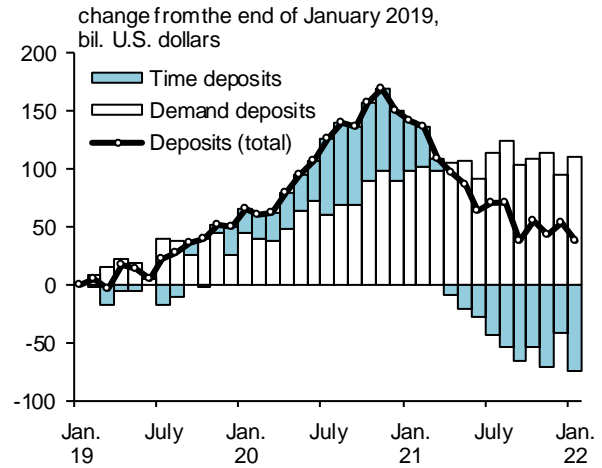
it is becoming more important for banks to carefully manage their foreign currency funding. To ensure that the stability of foreign currency funding is not impaired as a result of the focus on profitability, it is increasingly important to take into account the characteristics of depositors and their sensitivity to changes in interest rates.

**Chart IV-4-1: Stability gap among major banks**



Note: 1. "Corporate bonds, etc." and "Medium- to long-term FX and currency swaps" have funding maturing in more than 3 months until end-March 2012, and funding maturing in more than 1 year from end-June 2012 onward.  
 2. The figures indicate the ratios of the gaps to the loans (as at end-April 2014, end-December 2020 and end-January 2022).  
 3. Covers internationally active banks. Latest data as at end-January 2022.  
 Source: BOJ.

**Chart IV-4-2: Foreign currency-denominated deposits among major banks**



Note: Covers internationally active banks. Latest data as at end-January 2022.  
 Source: BOJ.

In this context, Japanese banks have increased their transaction account deposits in recent years with the aim of establishing stable foreign currency funding bases. This increase may reduce outflows of deposits in the event of a crisis (see Box 4 for foreign currency funding during periods in which financial conditions have deteriorated). During periods of an increase in U.S. interest rates, it may also work in the direction of widening deposit-lending spreads and thus have a favorable impact on profits (see Box 3 for a discussion of a rise in U.S. interest rates and the deposit-lending margins of Japanese banks). The challenges of improving the stability of foreign currency funding and strengthening crisis management tools while taking profitability into consideration continue to be important for Japanese banks, and they need to continue to work on further enhancing their risk management.

## E. Risks resulting from vulnerabilities that have been present since before the pandemic

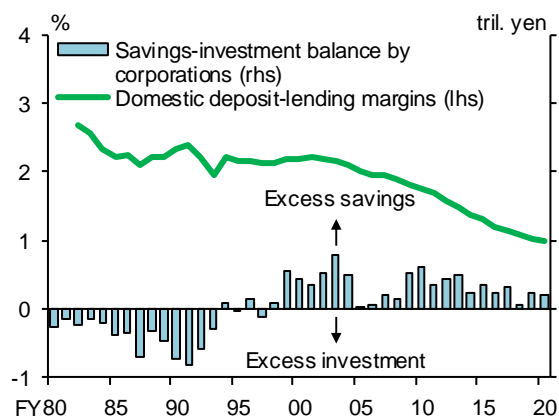
From a long-term perspective, Japanese financial institutions have been facing downward pressure on profitability, particularly in domestic deposit-taking and lending activities against the background of structural factors such as the fall in the potential growth rate reflecting the declining population and the resultant secular decline in loan demand, as well as the prolonged low interest rate environment. In fact, financial institutions' deposit-lending margins started to shrink from around

IV. Risks faced by financial institutions

E. Risks resulting from vulnerabilities that have been present since before the pandemic

2000, when the domestic corporate sector turned to persistent "excess savings" (Chart IV-5-1). These structural changes in the savings and investment balance have continued since the start of the pandemic, leading to a sustained decline in firms' loan demand through, for example, the increase in the share of debt-free firms (Chart IV-5-2).

**Chart IV-5-1: Deposit-lending margins among domestically licensed banks and excess savings by corporations**

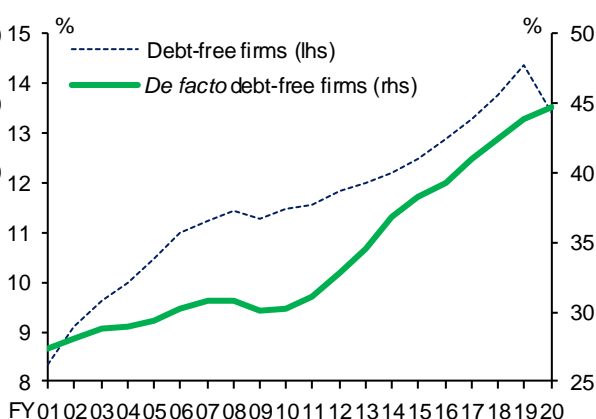


Note: 1. "Savings-investment balance by corporations" covers private nonfinancial corporations. "Domestic deposit-lending margins" covers regional banks.

2. Latest data as at fiscal 2020.

Source: BOJ.

**Chart IV-5-2: Share of debt-free firms**



Note: 1. "Debt-free firms" is defined as firms without borrowings. "De facto debt-free firms" is defined as firms whose cash and deposits exceed their total amount of borrowings.

2. Covers SMEs.

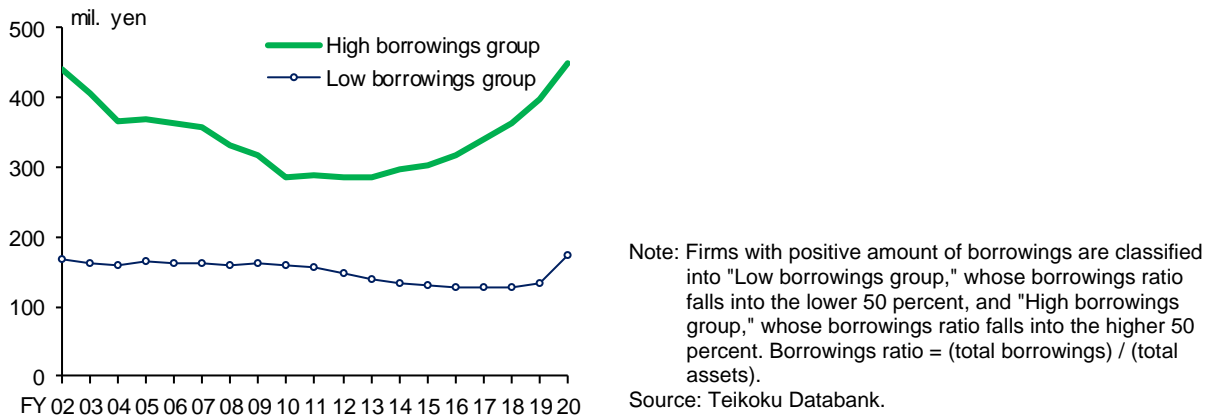
Source: Teikoku Databank.

Against this background, in order to secure profits, regional financial institutions have been active in risk-taking with regard to lending to domestic middle-risk firms, lending to the real estate industry, particularly to rental real estate businesses, and investment in domestic and overseas investment trusts, while major banks have been active in risk-taking mainly with regard to overseas lending and overseas credit product investment, as well as lending related to large-scale M&A deals. This active stance in domestic lending is likely a reason why the *total credit to GDP ratio* and the *real estate loans to GDP ratio* were already "red" before the outbreak of COVID-19 in the heat map in Section C of Chapter III (Charts III-3-1, III-3-2, and III-3-3). In what follows, caveats regarding lending to middle-risk firms and the real estate industry since the outbreak of the pandemic are presented.

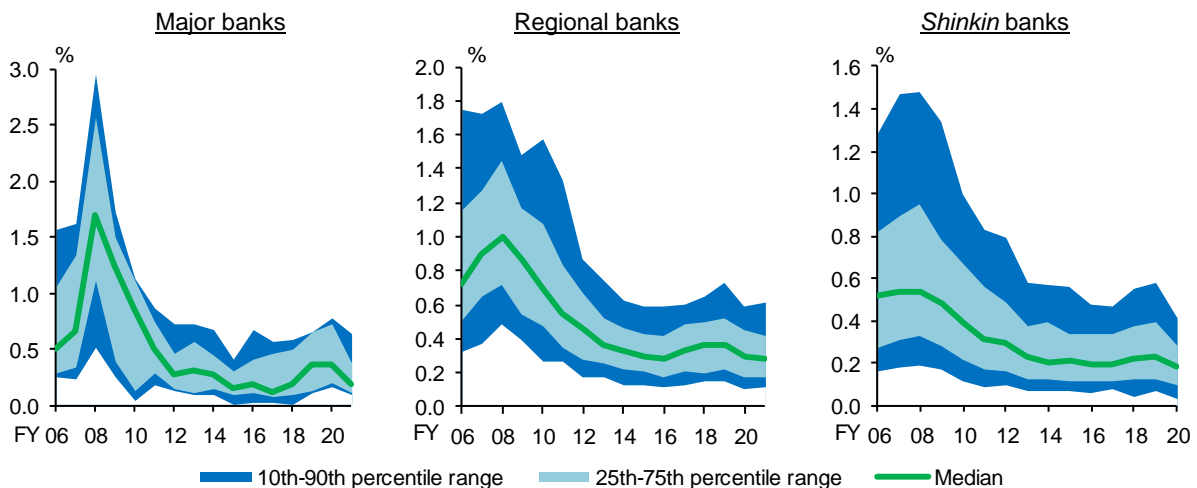
### 1. Lending to middle-risk firms and other firms

Amid the excess savings in the domestic corporate sector in the economy overall, increases in financial institutions' active lending tend to be observed at a more micro level -- for example, among specific industries or firms. In this regard, looking at developments in borrowings outstanding per firm by dividing firms between a high borrowings group and a low borrowings group based on their reliance on borrowing shows that the borrowings outstanding of the high borrowings group have been on an uptrend, suggesting that bank-dependent firms have increased their leverage (Chart IV-5-3). Lending to middle-risk firms likely includes a fair amount of loans to firms that are relatively vulnerable in terms of their financial condition, such as those with high leverage. Given the structural downward pressure on profits, financial institutions have increased their lending to these firms at low interest rates, partly due to intensifying competition among themselves.

**Chart IV-5-3: Borrowings outstanding per firm**



**Chart IV-5-4: Probability of being downgraded from "normal" to "special attention" or below**



Note: The latest data in the left-hand and middle charts are as at end-September 2021, and the latest data in the right-hand chart are as at end-March 2021.  
Source: BOJ.

Middle-risk firms appear to be classified into the bottom group of "normal" borrowers and other groups, and on the whole, no major vulnerabilities have materialized so far. However, credit costs increased before the pandemic, albeit slightly, from 2018 through 2019, reflecting a marginal increase in downgrades of borrowers from "normal" to "special attention" or below, indicating some concerns about a sudden default (Chart IV-5-4).

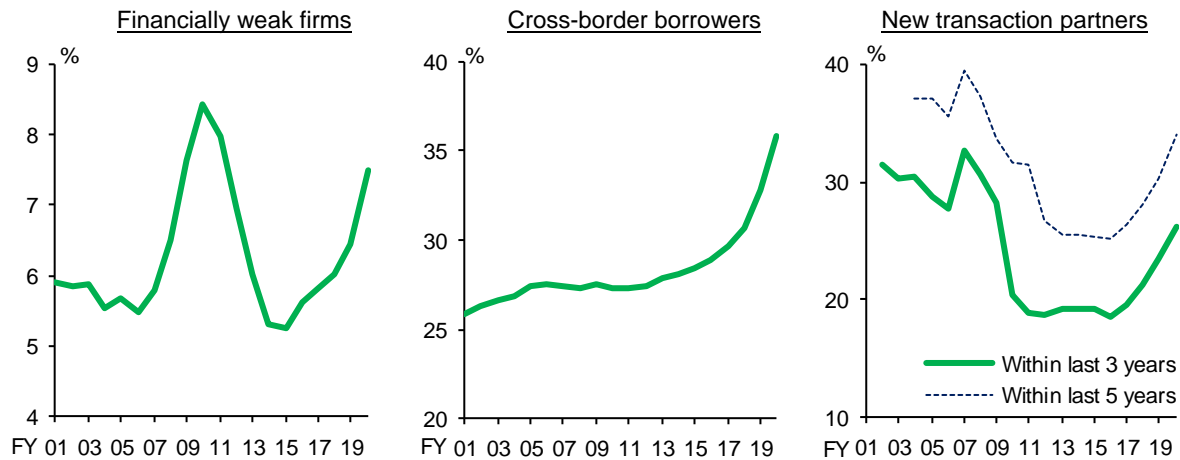
As pointed out in the October 2019 issue of the *Report*, triggers for the rise in credit costs at that time could be classified into the following two categories: (1) a delay in business restructuring at some low-performing firms that had had a long-standing business relationship with their financial institution, and (2) loosening of loan screening standards and credit risk management by financial institutions for some of their borrowers, such as those with which they had just recently started to build business ties in an environment where financial institutions have been making efforts to increase their lending. Regarding the first category, the share of "financially weak firms," i.e., firms for which financial conditions have continued to be in a state of substantial deterioration, has been rising in recent years, and this rising trend has continued from fiscal 2019 onward (Chart IV-5-5). Regarding the second category, the share of (1) "cross-border borrowers," i.e., borrowers located outside the prefecture where the lender's head office is located, and (2) "new transaction partners," i.e., borrowers with which the business relationship with a financial institution had just started, has

IV. Risks faced by financial institutions

E. Risks resulting from vulnerabilities that have been present since before the pandemic

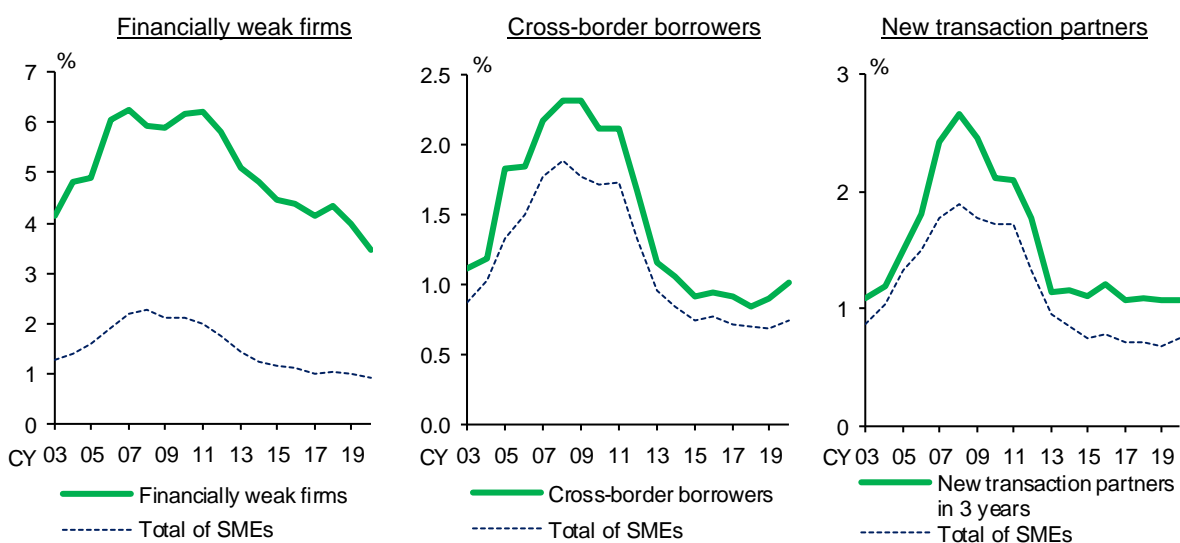
continued its uptrend. The default rates of these borrower groups are higher than the rate of SMEs overall (Chart IV-5-6).

**Chart IV-5-5: Number of firms by borrower group**



Note: The charts indicate the proportion of each group of borrowers in the total number of borrowers. Firms consist of SMEs. Latest data as at fiscal 2020. Firm groups are defined as follows.  
 Financially weak firms: Firms whose interest coverage ratio (ICR) has been below 1 for two consecutive years and whose debt to total asset ratio falls within the top 25th percentile of all borrowing firms.  
 Cross-border borrowers: Firms that are borrowing from at least one financial institution whose head office is in a different prefecture.  
 New transaction partners: Firms whose lender financial institutions differ from the previous year.  
 Source: Teikoku Databank.

**Chart IV-5-6: Firms' default rates by borrower group**



Note: 1. Covers SMEs. For a detailed definition of each group, see Chart IV-5-5. Latest data as at 2020.  
 2. Firms represented by "Total of SMEs" are not necessarily the same among the groups since firm samples are different.  
 3. Firms' default rates are defined as the proportion of the firms that within one year are downgraded to a borrower classification of "in danger of bankruptcy" or below, are delinquent for three months or more, or are subject to subrogation by a credit guarantee corporation.  
 Source: CRD Association; Teikoku Databank.

Since the outbreak of COVID-19, downgrades of borrowers from "normal" to "special attention" or below have not increased due in part to measures to support corporate financing (Chart IV-5-4). Moreover, regional financial institutions' profitability has been improving as a result of the acceleration of efforts to strengthen their business foundations, which in turn suggests that the

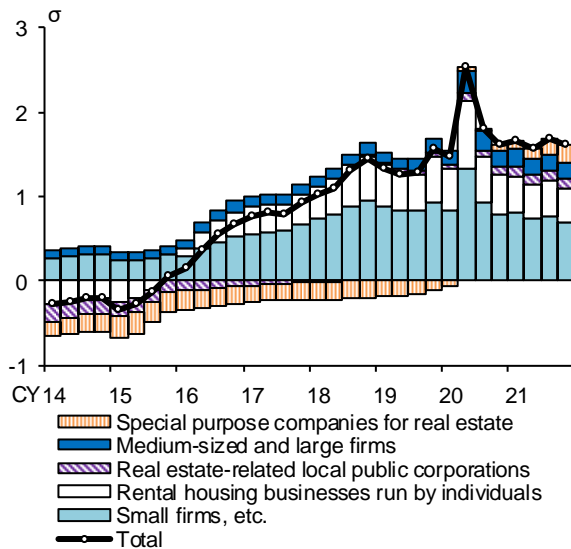


resilience of these institutions to vulnerabilities associated with these borrowers may have increased.<sup>44</sup> It is also notable, however, that the share of such borrower groups has been increasing since the start of the pandemic, and it is necessary to continue to closely monitor how these existing vulnerabilities will evolve during the spread of the pandemic and the resultant increase in lending.

## 2. Real estate-related risk

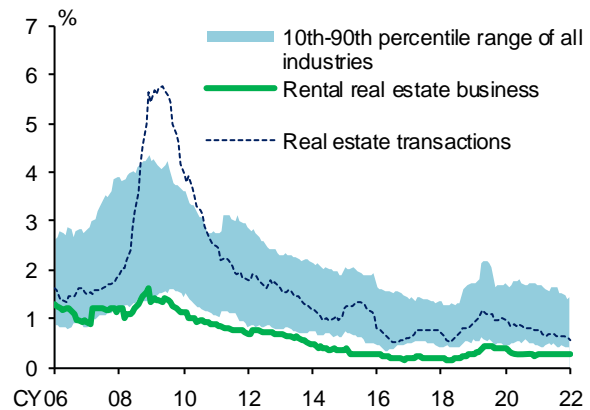
As seen in Section A of Chapter III, loans to the real estate industry have maintained a high growth rate that is unchanged from the period before the pandemic. A breakdown of the increase in the deviation from the trend of the *real estate loans to GDP ratio* in the heat map shows that, from 2016 until the present, the main contributors were the increase in loans to rental housing businesses run by individuals and to small firms (Chart IV-5-7). This subsection therefore provides an overview of the degree of risk in lending to small and medium-sized real estate firms, which is often hard to

**Chart IV-5-7: Breakdown of the real estate loans to GDP gap**



Note: 1. The breakdown is estimated by aggregating gaps between individual values and each one-sided HP filter trend. For the past period, for which data are not available, we extrapolate the figures by using year-on-year rates of changes of the total value.  
 2. "Small firms, etc." includes loans to J-REITs.  
 Source: Cabinet Office, "National accounts"; BOJ, "Loans and bills discounted by sector."

**Chart IV-5-8: Default rates by industry**



Note: 1. "10th-90th percentile range of all industries" indicates the distribution of default rates of a total of 24 industries, divided into 11 manufacturing industries and 13 non-manufacturing industries. Estimated by the BOJ.  
 2. The default rates are calculated based on the default numbers (past due more than three months or classified as "in danger of bankruptcy" and below) for the past 12 months.  
 3. Latest data as at January 2022.  
 Source: The Risk Data Bank of Japan.

gauge, with the help of granular data, also making a comparison with the period before the GFC, when default rates increased substantially, especially among real estate transaction businesses (Chart IV-5-8). Moreover, the information on individual transactions is used to examine whether the

<sup>44</sup> In fiscal 2020, the first year since the introduction of the "Special Deposit Facility to Enhance the Resilience of the Regional Financial System," many regional banks and *shinkin* banks accelerated their efforts to strengthen their business foundations, resulting in a decline in their overhead ratios (OHRs) due to both an increase in core gross operating profits (the denominator) and a decrease in expenses (the numerator). For more details on financial institutions' efforts in this regard, see "Efforts to Enhance the Resilience of the Regional Financial System: Strengthening the Business Foundations of Regional Financial Institutions and the Bank's Measures," *Financial System Report Annex Series*, September 2021 (available only in Japanese). Regional financial institutions are expected to continue to further push forward with efforts to strengthen their business foundations, including improvement in their OHRs.

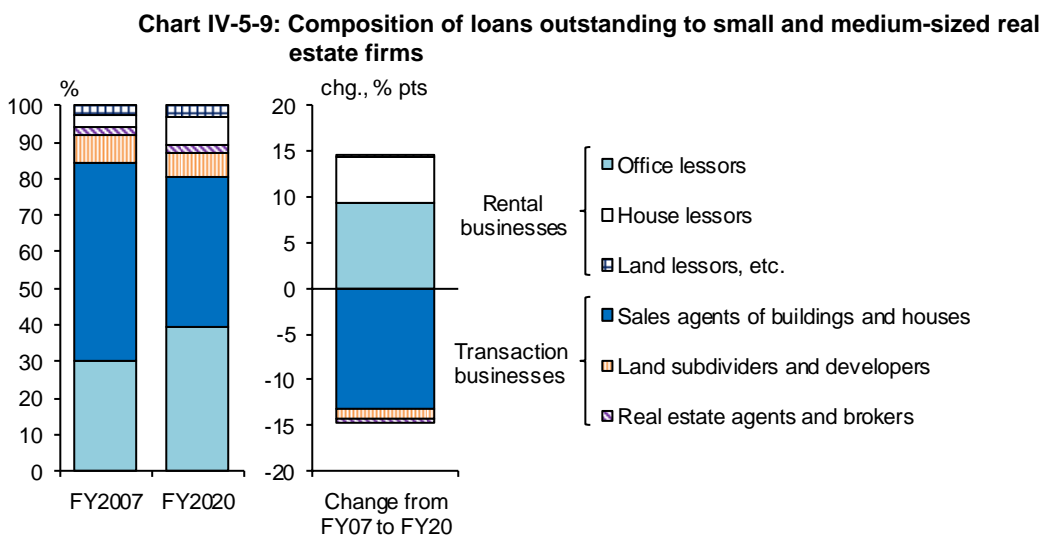
IV. Risks faced by financial institutions

E. Risks resulting from vulnerabilities that have been present since before the pandemic

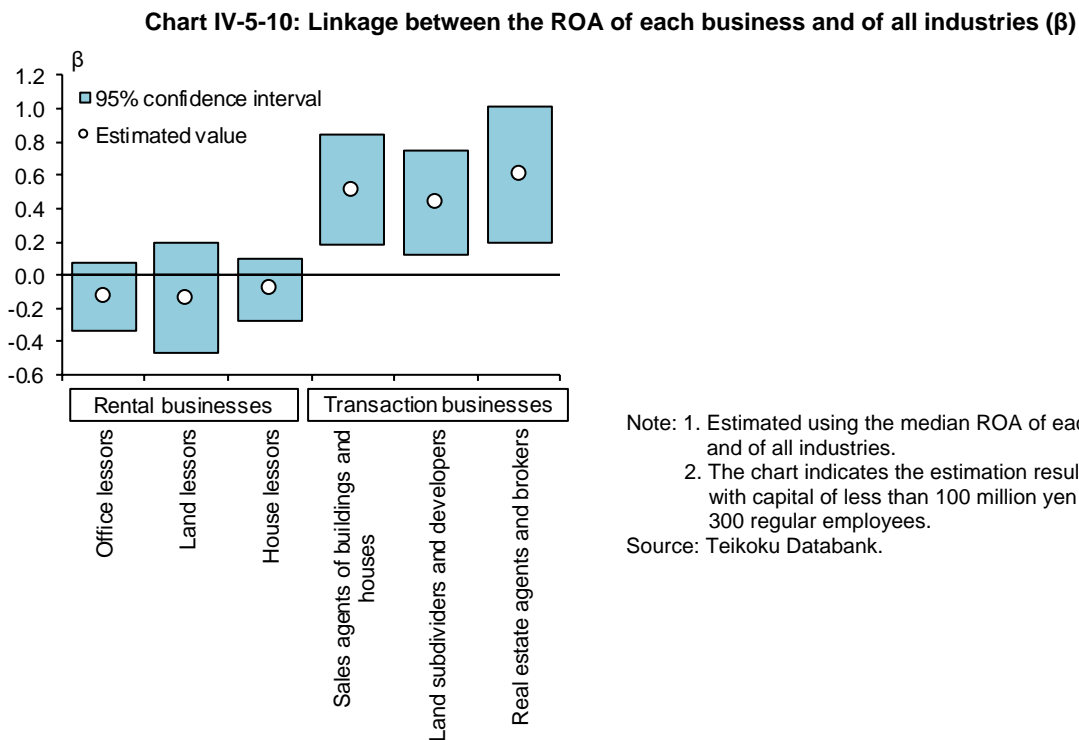
active inflow of funds into the real estate market to date has led to a buildup of vulnerabilities in terms of real estate prices and yields.

*Vulnerabilities linked to the types of borrowers*

To start with, a breakdown of loans to SMEs by business category shows that, compared to the period before the GFC, there has been a relatively small increase in loans to real estate transaction businesses, such as sales agents of buildings and houses and land subdividers and developers,



Note: Covers SMEs with capital of less than 100 million yen or fewer than 300 regular employees.  
Source: Teikoku Databank.



Note: 1. Estimated using the median ROA of each industry and of all industries.  
2. The chart indicates the estimation results for SMEs with capital of less than 100 million yen or fewer than 300 regular employees.  
Source: Teikoku Databank.

while there has been a marked increase in loans to rental businesses, especially office lessors (Chart IV-5-9). Focusing on the risk characteristics of rental businesses such as office and house lessors, the ROA of rental businesses has remained very stable, and their profit structure is less

susceptible to short-term economic fluctuations than that of real estate transaction businesses (Chart IV-5-10). Since they do not hold inventories, their risk of running out of working capital during a crisis can also be regarded as small. In addition, their capital ratios have continued to follow a moderate upward trend and have been higher than those of real estate transaction businesses. Given these characteristics, vulnerabilities associated with current lending to real estate businesses are considered as relatively low compared to the period before the GFC, when lending to real estate transaction businesses, including small and medium-sized developers, was elevated.

However, profits in rental real estate businesses are closely linked to the medium- to long-term demand structure. Attention is warranted on the risk that the increase in vacancy rates due to demographic changes, as well as the deterioration in rents due to intensifying competition in rental real estate businesses, especially in the metropolitan areas, may put downward pressure on profits over the medium to long term, leading to defaults on loans to the rental businesses, for which debt repayment capacities rely on stable rental income (Charts IV-5-11 and IV-5-12). Moreover, attention also needs to be paid to the risk that a possible decline in inbound tourism demand following the outbreak of COVID-19 and structural changes such as demographic changes may not only lead to a deterioration in the profits of rental businesses but also impede financial stability through falling land values (see Box 1).

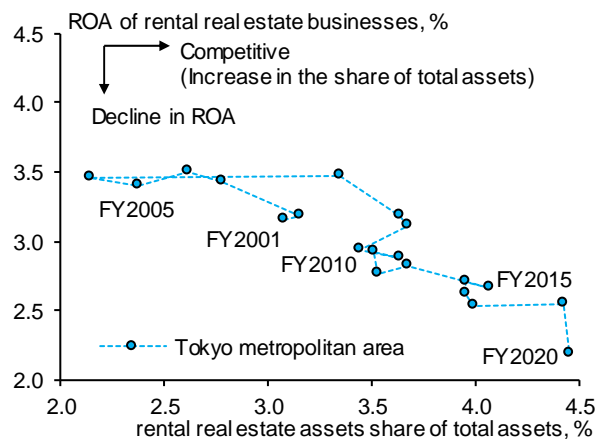
**Chart IV-5-11: Relationship between changes in population and vacancy rates**



Note: 1. Each prefecture is represented by a bubble, whose size indicates the size of population.  
 2. The chart shows average changes for every five years between 1998 and 2018.  
 3. Vacancy rate = (number of vacant rooms in flats) / (total number of rooms in flats).

Source: Ministry of Internal Affairs and Communications, "Housing and land survey," "Population estimates."

**Chart IV-5-12: ROA of rental real estate businesses facing competitive pressure**



Note: 1. "Rental real estate assets share of total assets" indicates the share of total assets of rental real estate businesses in total assets of all industries.  
 2. "ROA of rental real estate businesses" indicates the median of ROA of small and medium-sized rental real estate firms whose main offices are in Tokyo, Saitama, Chiba, or Kanagawa (Tokyo metropolitan area). SMEs are defined as enterprises with capital of less than 100 million yen or fewer than 300 regular employees.  
 Source: Teikoku Databank.

### Vulnerabilities in terms of prices

The strong inflow of funds into the real estate industry, including rental businesses, has resulted in active real estate transactions. It is therefore also important to examine whether these transactions have caused overly optimistic expectations of higher prices and have been giving rise to an overheating in real estate prices.

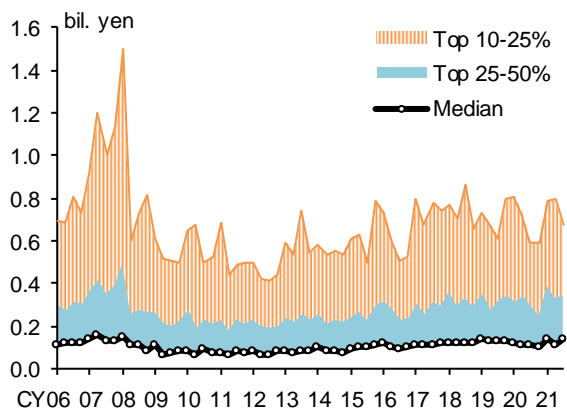
In the commercial real estate market -- just before the GFC, which saw a surge in default rates on loans to real estate businesses -- an increase in transactions of high-priced properties and a

IV. Risks faced by financial institutions

E. Risks resulting from vulnerabilities that have been present since before the pandemic

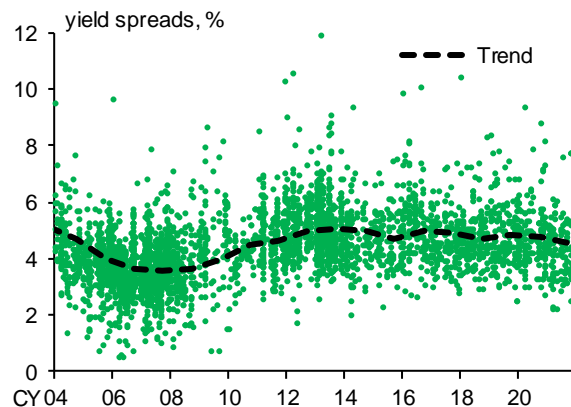
widening of the commercial land price distribution in an upward direction were observed; however, no such observations can currently be made (Chart IV-5-13). In terms of the yield spreads on individual properties in real estate transactions, transactions at excessively low yields were seen during the period prior to the GFC but are not in evidence at the moment (Chart IV-5-14).

**Chart IV-5-13: Distribution of individual commercial property transaction prices (23 Tokyo wards)**



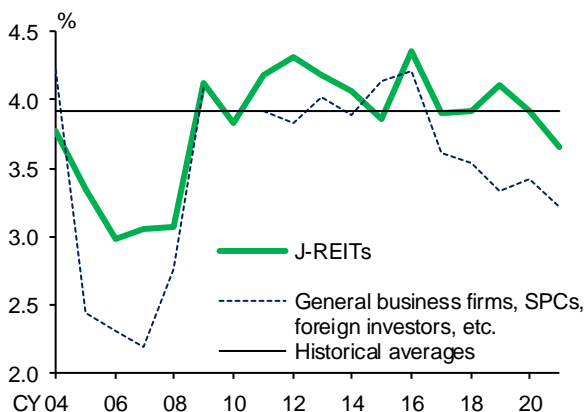
Note: Latest data as at the July-September quarter of 2021.  
Source: Ministry of Land, Infrastructure, Transport and Tourism, "Real estate transaction-price information."

**Chart IV-5-14: Yield spreads on individual properties in real estate transactions**



Note: 1. Green dots indicate individual real estate transactions. Latest data as at end-December 2021. "Trend" indicates 2-year backward moving averages.  
2. Yield spreads = (capitalization rates) - (base rates). Capitalization rates are based on Nikkei DEAL SEARCH. Base rates are 10-year government bond yields.  
Source: BOJ calculations based on "Nikkei real estate market information DEAL SEARCH."

**Chart IV-5-15: Yield spreads on individual properties traded by type of buyer**



Note: 1. The differences in the characteristics of individual properties (type of use, location, age, total floor area, number of aboveground floors, and number of basement floors) are controlled in the estimation.  
2. The chart indicates coefficients of dummy variables for the transaction year of type of buyer, which is standardized by office transactions in Tokyo.  
3. "General business firms, SPCs, foreign investors, etc." in 2010 is excluded because of lack of samples.  
4. Latest data as at 2021.  
Source: BOJ calculations based on "Nikkei real estate market information DEAL SEARCH."

Estimates of yield spreads on individual properties traded by type of buyer, with differences in yields indicated by such characteristics as type of use, property location, and age being controlled, show that yield spreads have become higher than before the GFC regardless of type of buyer, including

J-REITs and general business firms (Chart IV-5-15). However, the downward trend in yield spreads since 2016 seems to have continued even after the outbreak of COVID-19. Furthermore, the acquisition of commercial real estate by foreign investors and the inflow of funds from foreign investment funds into Japanese real estate funds such as REITs, which play a large role as buyers, have been increasing.<sup>45</sup> It should therefore be noted that not only domestic factors but also shocks in global markets may exert downward pressure on real estate transaction prices (see Box 2).

## F. Risks posed by structural changes in the business environment

Lastly, this section addresses risks posed by structural changes in the business environment surrounding financial institutions, focusing on recent developments and prospects regarding cyber risk, climate-related financial risks, and interest rate benchmark reform.

### 1. Cyber risk

Cyber risk has the following characteristics: (1) financial institutions may be hit by a cyberattack that goes beyond, in terms of technological aspects and scale, the self-defenses they have put in place, given the rapid sophistication of cyberattacks; (2) if a cyberattack is successful, it may instantaneously propagate to other financial institutions and to the entire financial system, since the financial institutions are interconnected through financial and securities settlement networks, etc.; and (3) the quantification of such risk is difficult and, moreover, there remains a risk that the capital built up by financial institutions for the purpose of loss absorption may not be sufficient to internalize losses that arise from the negative externalities. In addition, since whether and what information on losses from cybercrime should be released is up to the victims of cyberattacks, the amount and comprehensiveness of information disclosed are insufficient.

Looking at the number of cyberattacks reported to the National Center of Incident Readiness and Strategy for Cybersecurity by Japan's critical infrastructure providers in the first half of fiscal 2021, the number of cases of information leakage, data corruption such as of files, and attacks that made it difficult to use computer systems in total reached around 70 percent of the previous fiscal year's figures in the first half alone (Chart IV-6-1). The most conspicuous cases were (1) damage caused by ransomware and (2) data theft through the exploitation of software vulnerabilities. With regard to ransomware in particular, among financial institutions that had not suffered significant damage in the past, there was a case where an affected firm was unable to restore its computer systems after the attack and even discontinued some of its services.

**Chart IV-6-1: Number of reports to NISC from critical infrastructure providers**

	FY2017	FY2018	FY2019	FY2020	number	
					FY2021	
					H1	Oct.-Dec.
Information leakage	15	13	13	23	16	2
Data corruption	20	17	11	12	11	5
Problems in using systems	143	97	158	157	103	41

Source: National Center of Incident Readiness and Strategy for Cybersecurity.

<sup>45</sup> For details, see Box 3 in the April 2021 issue of the *Report*.

While it is difficult to avert cyberattacks completely, it is important to limit the potential damage as much as possible by reducing the risk of information leakage and avoiding the suspension of critical business operations through a strengthening of existing operational risk management and enhancing "operational resilience."<sup>46</sup> Reflecting changes in the environment such as the spread of COVID-19 and the increase in cyberattacks, the Basel Committee on Banking Supervision (BCBS) in March 2021 released the "Principles for Operational Resilience" and, moreover, revised the "Principles for the Sound Management of Operational Risk" to enhance the content relevant to ensuring information and communication technology (ICT) security.<sup>47,48</sup> In addition, in response to the significant increase in cyberattacks during the pandemic, the Financial Stability Board (FSB) signaled its intention to continue with efforts to strengthen resilience against cyber risks in its report "Lessons Learnt from the COVID-19 Pandemic from a Financial Stability Perspective: Final Report" released in October 2021. Against this background, at the G20 Finance Ministers and Central Bank Governors Meeting in February 2022, the participants agreed to continue to work together on improving operational resilience, including addressing cyber risks in the financial sector. Based on these principles and this agreement, financial institutions, in addition to building defenses against threats, need to enhance their resilience by preparing plans to minimize any damage and by, for example, regularly conducting vulnerability assessments and attack simulations to examine the effectiveness of the plans. For financial institutions with group companies and overseas bases, efforts to improve resilience across group companies and on a global basis are also an important issue.

Financial institutions also need to pay special attention when using external services for the management of their system infrastructure and information assets. When financial institutions use external services such as cloud services, the scopes of responsibility of the financial institution and the service provider need to be clarified in advance, and the responsibilities within the scope of the service provider need to be properly managed within the framework of vendor management.<sup>49</sup> Moreover, financial institutions need to exercise adequate governance of those involved in API connections, such as understanding and evaluating the process through which the identities of their customers, when providing their data, are verified.

## 2. Climate-related financial risks

There is a growing awareness that climate change is a global challenge that could have a broad impact on our society and economic activity for the future, and international discussions are progressing on how to address this issue. At the 26th session of the Conference of the Parties to the United Nations Framework Convention on Climate Change (COP 26), the Glasgow Climate

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<sup>46</sup> The concept of "operational resilience" refers to the ability of a financial institution to deliver critical operations even in the event of disruptions that make it difficult to perform business operations, including not only cyberattacks but also natural disasters and computer system failures.

<sup>47</sup> The "Principles for Operational Resilience" consist of principles regarding the continuation of banks' critical operations in the event of a cyberattack or natural disaster in seven categories: governance; operational risk management; business continuity planning and testing; mapping of interconnections and interdependencies of critical operations; third-party dependency management; incident management; and resilient information and communication technology (ICT), including cyber security.

<sup>48</sup> The "Principles for the Sound Management of Operational Risk" (first published in 2003) provide guidelines for banks' operational risk management (identification, assessment, monitoring, and control/mitigation).

<sup>49</sup> For details, see "Key Considerations for Risk Management in Using Cloud Services," *Financial System Report Annex Series*, March 2021.

Pact was adopted, and all parties agreed on international rules for a greenhouse gas emissions trading scheme.

Climate-related financial risks are risks that physical phenomena, such as disasters and rising sea levels triggered by climate change, as well as policy changes and technical innovations associated with the transition to a carbon-neutral economy, could impair the resilience of financial institutions and the stability of the financial system, including those that emerge from damage to financial institutions' assets.<sup>50</sup> In the area of financial transactions, global efforts toward addressing climate-related financial risks have been underway in line with the FSB Roadmap for Addressing Climate-related Financial Risks formulated by the FSB in July 2021.<sup>51</sup> The roadmap consists of four main, interrelated areas: firm-level disclosures, data, vulnerabilities analysis, and regulatory and supervisory practices and tools.

With regard to the promotion of firm-level disclosures, the International Financial Reporting Standards (IFRS) Foundation announced at the COP26 the creation of the International Sustainability Standards Board (ISSB) to promote the formulation of disclosure standards for climate-related financial risks.

As for data, the FSB and the Network for Greening the Financial System (NGFS) have been working on identifying so-called data gaps based on the recognition that the lack of available data (data gaps) has been a constraint on analysis of climate-related financial risks.

With regard to analysis of vulnerabilities, national and regional financial authorities as well as financial institutions have been working on developing methods to quantitatively assess climate-related financial risks, and on developing risk management frameworks. Regarding quantifying climate-related financial risks, there is widespread recognition of the benefits of conducting scenario analyses using simulations based on certain assumptions concerning the extent of climate change and its impact on the economy, and a growing number of financial authorities and financial institutions are conducting such analyses.<sup>52,53</sup>

The BCBS has been working on developing regulatory and supervisory practices and tools. In November 2021, it released a consultative document called "Principles for the Effective Management and Supervision of Climate-related Financial Risks" with a view to improving practices

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<sup>50</sup> Generally, risks of losses due to physical phenomena are referred to as physical risks and risks of losses due to changes that occur in the transition process to a carbon-neutral economy are called transition risks.

<sup>51</sup> For details on the roadmap, see <https://www.fsb.org/2021/07/fsb-roadmap-for-addressing-climate-related-financial-risks/>.

<sup>52</sup> In October 2021, the NGFS released "Scenarios in Action: a progress report on global supervisory and central bank climate scenario exercises," a report compiling national and regional financial authorities' climate scenario exercises. About 30 jurisdictions, including Japan, participated in such exercises. The report shows that jurisdictions that have conducted scenario analyses are mostly in Europe, but this is spreading to Asia-Pacific, the Americas, and Africa.

<sup>53</sup> The European Central Bank (ECB) conducted stress testing of euro area banks using data on millions of firms around the world, and then released the results. The Bank of England (BOE), as well as the Autorité de Contrôle Prudentiel et de Résolution (ACPR) and the Banque de France, respectively conducted an exercise in which participating financial institutions assessed the impact of climate change on themselves based on the common scenarios defined by the respective authorities. The Bank of Canada (BOC) and the Office of the Superintendent of Financial Institutions of Canada (OSFI) quantitatively assessed transition risks based on the common scenario set by the authorities, using complementarily the information on the authorities' evaluation of the impact of climate change on financial institutions and the information on participating financial institutions' evaluation of such impact on themselves.

related to the management of climate-related financial risks and providing a common baseline for internationally active banks and the supervisors.<sup>54</sup>

Amid these international trends, major financial institutions in Japan have estimated the impact on their financial conditions themselves based on scenario analysis methods in line with the recommendations of the Task Force on Climate-related Financial Disclosures (TCFD) and have released the results. These financial institutions have also worked on further sophistication of their analytical methods and expanding the coverage of these analyses. In addition, some regional financial institutions have started to show support for the TCFD recommendations. Moreover, based on the recognition that climate-related financial risks could have a significant impact on their business operations, an increasing number of financial institutions have developed a supervisory and executive structure in which the board of directors and senior management are involved, or have formulated guidelines with regard to investments and loans in specific sectors where there are concerns about the potential impact of climate change.

Climate-related financial risks differ from conventional financial risks, in that (1) the degree of uncertainty regarding the nature and impact of climate change and related policy and technological changes is much greater, (2) the time horizon over which risks materialize is much longer, and (3) there are significant data gaps. Thus, financial experts have started accumulating knowledge in order to quantitatively assess these risks. For financial institutions, this means that it is becoming increasingly important to examine how to assess and manage the risks and how to compile the necessary data to do so, while gathering information on various initiatives at home and abroad.

The Bank of Japan released "The Bank of Japan's Strategy on Climate Change" in July 2021 and has furthered its efforts on climate change consistent with its mandate of achieving price stability and ensuring the stability of the financial system.<sup>55</sup> From December 2021, the Bank has conducted the Funds-Supplying Operations to Support Financing for Climate Change Responses to support financing of the private sector for their efforts on climate change. The Bank, together with the Financial Services Agency (FSA), has started a scenario analysis pilot exercise focusing mainly on large financial institutions with a view to quantifying climate-related financial risks.

### 3. Interest rate benchmark reform

The publication of yen LIBOR ceased at the end of 2021 as scheduled. In the Japanese market, for most contracts referencing yen LIBOR, the transition to alternative interest rate benchmarks

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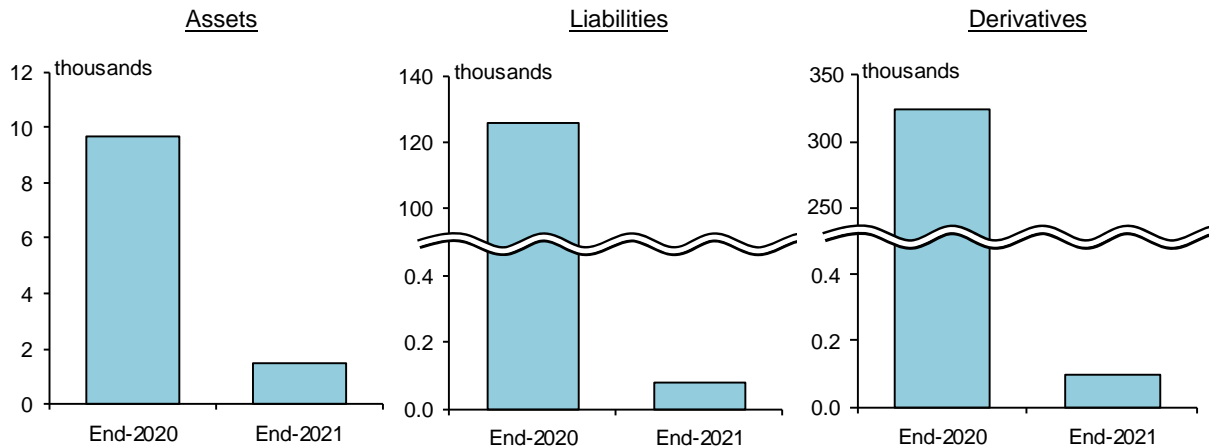
<sup>54</sup> The document presents 18 principles for banks and supervisors while maintaining sufficient flexibility given the degree of heterogeneity and evolving practices across jurisdictions in addressing climate-related financial risks. For details, see <https://www.bis.org/bcbs/publ/d530.pdf>.

<sup>55</sup> See the Bank of Japan's website ([https://www.boj.or.jp/en/announcements/release\\_2021/rel210716b.htm/](https://www.boj.or.jp/en/announcements/release_2021/rel210716b.htm/)).



was completed by the end of 2021, and transactions referencing alternative benchmarks have been made without any particular problems (Chart IV-6-2).<sup>56</sup>

**Chart IV-6-2: The number of contracts referencing JPY LIBOR**



Note: 1. The data are for contracts that do not incorporate fallback provisions.

2. The data for end-2020 are for contracts maturing beyond end-2021.

Source: Financial Services Agency and BOJ, "Summary of Results of the Third Survey on the Use of LIBOR."

The series of measures taken with regard to the transition from LIBOR triggered by the LIBOR manipulation scandal in 2012 can be judged to have been completed in a smooth and orderly manner in the Japanese market. The Cross-Industry Committee on Japanese Yen Interest Rate Benchmarks, for which the Bank of Japan acts as the secretariat, played a central role in supporting initiatives in the market overall by establishing alternative interest rate benchmarks and formulating the roadmap to prepare for the transition from yen LIBOR.<sup>57</sup> Against this background, individual entities such as financial institutions, institutional investors, and business corporations have generally made steady progress with the series of measures, such as developing a framework for deliberation, negotiating contracts, and reviewing operations and systems in line with the roadmap. In the meantime, Japan's FSA and the Bank of Japan, while deepening their dialogue with financial institutions, have encouraged the transition through examination of financial institutions' preparedness.<sup>58</sup>

<sup>56</sup> For contracts for which the transition is not complete, it is necessary to complete the transition by the day of the first revision of interest rates. Should there be any legacy contracts that cannot feasibly be transitioned away from yen LIBOR, the use of synthetic yen LIBOR (pseudo yen LIBOR calculated using market data) would be an option. Such cases are expected to be dealt with in line with the report on the results of the public consultation released by the Cross-Industry Committee on Japanese Yen Interest Rate Benchmarks. For details, see Cross-Industry Committee on Japanese Yen Interest Rate Benchmarks, "Final Report on the Results of the Public Consultation on the Treatment of Tough Legacy Contracts in Japan," November 2021, and Strategy Development and Management Bureau and Supervision Bureau, FSA, and Financial System and Bank Examination Department and Financial Markets Department, Bank of Japan, "LIBOR Transition based on the *Final Report on the Results of the Public Consultation on the Treatment of Tough Legacy Contracts in Japan* published by the Cross-Industry Committee on Japanese Yen Interest Rate Benchmarks," November 2021.

<sup>57</sup> The Cross-Industry Forum on Interest Rate Benchmarks was established in March 2022 following the reorganization of the Cross-Industry Committee on Japanese Yen Interest Rate Benchmarks. For details, see Financial Markets Department, Bank of Japan, "Establishment of the 'Cross-Industry Forum on Interest Rate Benchmarks,'" March 2022.

<sup>58</sup> After the publication of the October 2021 *Financial System Report*, the FSA and the Bank released the "Key Results of the Brief Survey on the Use of JPY LIBOR" (reference date of end-September 2021) and the "Summary of Results of the Third Survey on the Use of LIBOR" (reference date of end-December 2021). Moreover, they informed financial institutions of their thinking and policies regarding synthetic yen LIBOR.

- IV. Risks faced by financial institutions
- F. Risks posed by structural changes in the business environment

The publication of U.S. dollar LIBOR is scheduled to cease at the end of June 2023 (Chart IV-6-3). U.S. dollar LIBOR is widely used by Japanese financial institutions and business corporations, and they are required to take action in accordance with the guidelines issued by the U.S. authorities and the Alternative Reference Rates Committee (ARRC).<sup>59</sup>

**Chart IV-6-3: The end date of LIBOR panel publication**

Currency	Tenors	The end date of LIBOR panel publication
JPY	all (Overnight, 1-week, 1-, 2-, 3-, 6-, and 12-month)	December 31, 2021
GBP		
EUR		
CHF		
USD	1-week and 2-month	June 30, 2023 (Cessation of new transactions after December 31, 2021, subject only to some limited exceptional use to support an orderly transition)
	Overnight, 1-, 3-, 6-, and 12-month	

<sup>59</sup> Since January 2022, the U.S. authorities have called for the cessation of new transactions referencing U.S. dollar LIBOR, excluding some exceptions. For details, see FRB, "Statement on LIBOR transition," November 2020 and "Assessing Supervised Institutions' Plans to Transition Away from the Use of the LIBOR," March 2021.

## V. Examination of the resilience of the financial system

### Financial institutions' profitability and capital adequacy

- Looking at the financial results of financial institutions for the first half of fiscal 2021, net income increased year-on-year both for major banks and regional banks due to an increase in pre-provision net revenue (PPNR) excluding trading income and a decline in credit costs. The capital adequacy ratios of financial institutions have remained sufficiently above the regulatory requirements as the ratios have increased for both internationally active banks and domestic regional banks.

### Macro stress testing

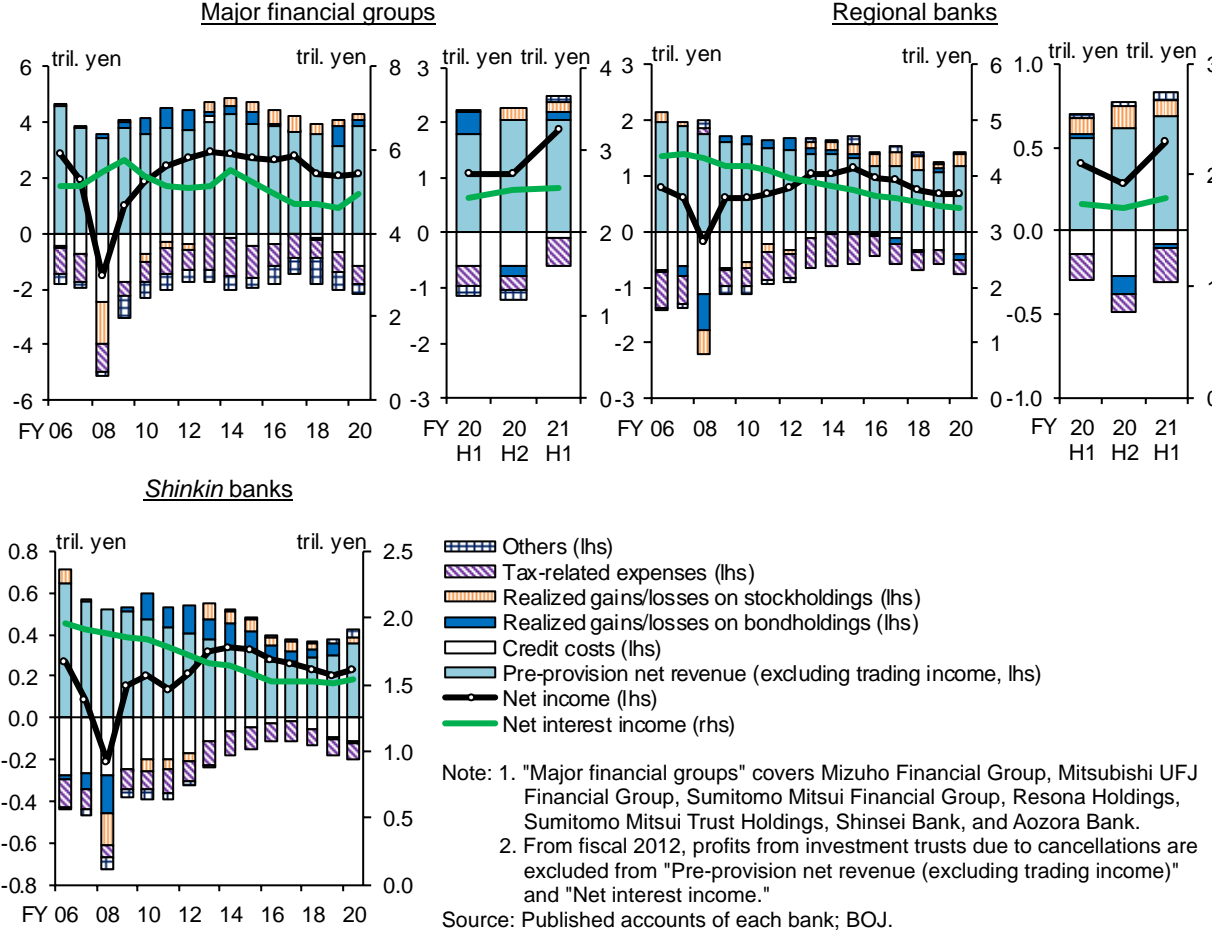
- In this *Report*, the resilience of financial institutions and the financial system is examined, under two downside scenarios.
- The first downside scenario -- the "COVID-19 resurgence with rising overseas interest rates scenario" -- assumes that the domestic and overseas economies are hit by an adverse shock caused mainly by a resurgence in the pandemic and the resultant supply constraints. It also assumes that a simultaneous rise in U.S. long-term interest rates pushes down the real economy further, particularly in emerging economies, which have been susceptible to pressure for capital outflows, and leads to an adjustment in global financial markets. Under this scenario, the increase in credit costs as well as the declines in PPNR excluding trading income and in unrealized gains/losses on securities holdings largely affect internationally active banks, while the increase in credit costs and the decline in realized gains/losses on securities holdings largely affect domestic regional banks and *shinkin* banks. Capital adequacy ratios, however, on average remain above regulatory levels for all types of banks.
- The second downside scenario -- the "financial stress scenario" -- assumes a situation in which global financial markets experience a substantial and rapid adjustment comparable to that during the GFC, which has a negative impact on financial intermediation activities, putting further downward pressure on the domestic and overseas economies. Capital adequacy ratios are lower than in the "COVID-19 resurgence with rising overseas interest rates scenario" for all types of banks due to the increase in credit costs as well as the larger declines in PPNR excluding trading income and in realized gains/losses on securities holdings. The CET1 ratio of a fair number of internationally active banks declines to a level that breaches the capital buffer ratios.
- Japan's financial system is likely to remain highly robust even in the event of a resurgence of COVID-19 and a simultaneous rise in U.S. long-term interest rates. However, in the event of a substantial and rapid adjustment in global financial markets, a deterioration in financial institutions' financial soundness and the resultant impairment of the smooth functioning of financial intermediation could pose a risk of downward pressure on the real economy.

**A. Financial institutions' profitability and capital adequacy**

**1. Profitability**

Financial institutions' net income had been declining moderately in recent years, mainly against the background of the downward trend in domestic net interest income, but increased in fiscal 2020 for major banks, regional banks, and *shinkin* banks. It further increased year-on-year both for major banks and regional banks in the first half of fiscal 2021 on the back of an improvement in PPNR excluding trading income and a decline in credit costs (Chart V-1-1).

**Chart V-1-1: Developments in and decomposition of net income**



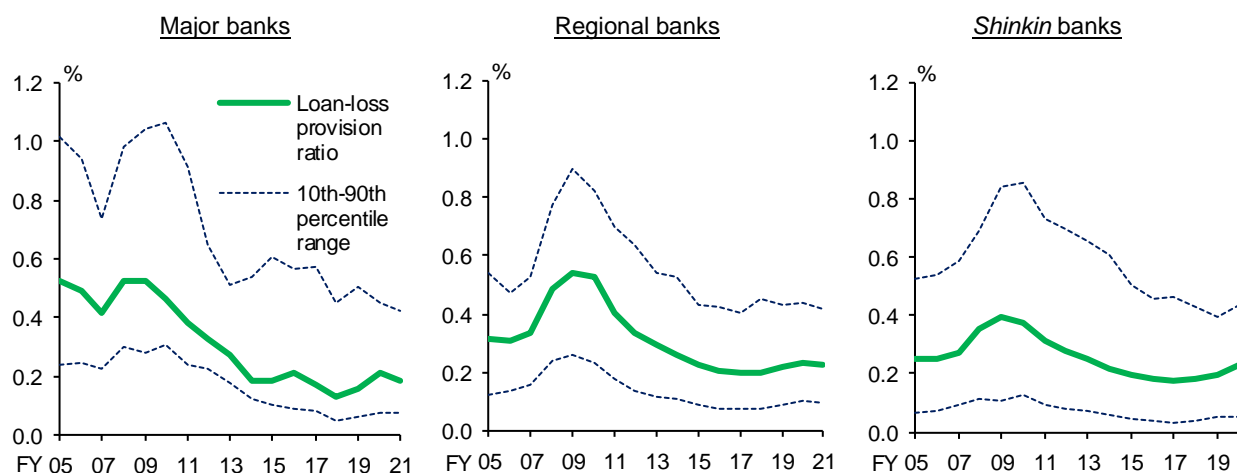
PPNR excluding trading income, which shows financial institutions' core profitability, increased both for major banks and regional banks in the first half of fiscal 2021 year-on-year, mainly due to increases in interest and dividends on securities and in fees and commissions on sales of investment trusts amid the rise in stock prices at home and abroad. Although realized gains/losses on stockholdings increased, realized gains/losses on securities holdings overall declined due to a decrease in realized gains/losses on bondholdings. Credit costs declined both for major banks and regional banks, reflecting the overall decline in downgrades of borrowers.

**Loan-loss provision ratios**

Loan-loss provision ratios in terms of the amount of general provisions for normal loans and "need attention" loans, after having risen slightly for all bank types in fiscal 2020, partly due to an increase

in precautionary loan-loss provisions, generally remained at the same level in the first half of fiscal 2021 (Chart V-1-2). Survey results indicate that an increasing number of regional financial institutions are reviewing loan-loss provisioning methods, including the introduction of loan-loss provisioning that groups borrowers according to their risk characteristics, in order to prepare for possible losses in a more conservative manner.<sup>60</sup> Financial institutions need to continue considering their loan-loss provisioning methods in line with their lending policies and loan portfolios. In doing so, they also need to be fully aware of the impact on credit risk, such as that associated with a deceleration in the recovery pace of corporate profits due to the pandemic.

**Chart V-1-2: Loan-loss provision ratios**



Note: 1. Ratios of general loan-loss provisions to the total amount of normal loans and "need attention" loans.

2. The latest data in the left-hand and middle charts are as at end-September 2021, and the latest data in the right-hand chart are as at end-March 2021.

Source: BOJ.

## 2. Capital adequacy

The capital adequacy ratios of financial institutions have been sufficiently above the regulatory requirements for all types of banks (Chart V-1-3).<sup>61</sup> Although the ratios had been declining in recent years as retained earnings were growing at a slower pace than risk-weighted assets, they rose in fiscal 2020 due to the accumulation of retained earnings and continued to rise slightly in the first half of fiscal 2021 both for internationally active banks and domestic regional banks (Chart V-1-4). The capital level of the financial system as a whole is adequate relative to the amount of various types of risk financial institutions take, and financial institutions have sufficient loss absorption capacity (Chart V-1-5).<sup>62</sup>

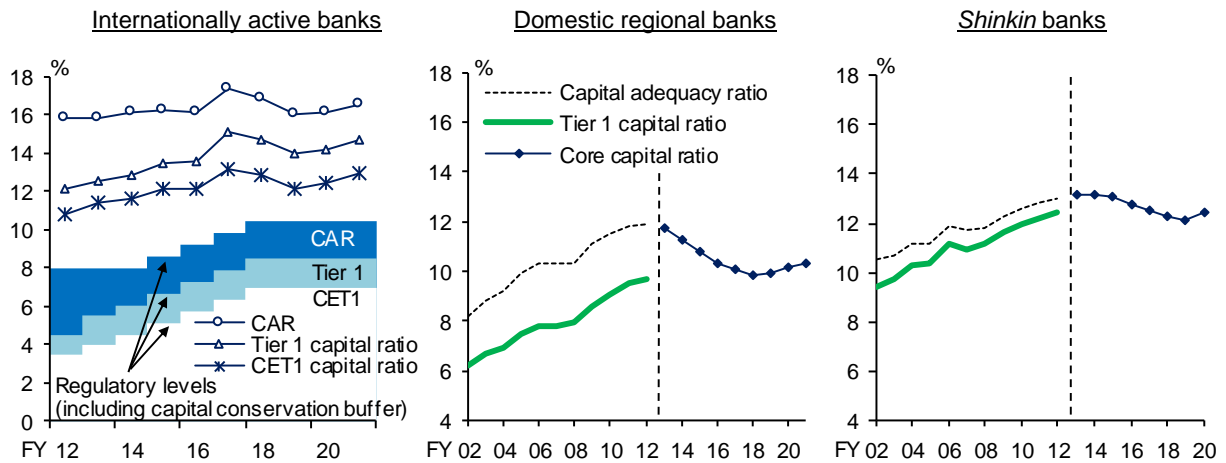
<sup>60</sup> For details on regional financial institutions' efforts in terms of credit management, see "Review of Loan-Loss Provisioning Methods as well as Improvements in Credit Screening and Monitoring by Regional Financial Institutions," *Financial System Report Annex Series*, December 2021 (available only in Japanese).

<sup>61</sup> Internationally active banks and domestic banks are required to maintain a CET1 capital ratio of 4.5 percent and a core capital ratio of 4 percent, respectively. Internationally active banks are also required to meet capital buffer regulations designed to build up an additional buffer to prevent credit supply constraints under stress conditions. The capital buffer regulations include the requirement of a capital conservation buffer of 2.5 percent, a countercyclical capital buffer of 0 to 2.5 percent, and a capital buffer for global systemically important banks (G-SIBs) of 1 to 2.5 percent or domestic systemically important banks (D-SIBs) of 0.5 percent. Banks are able to use their buffers as necessary to maintain lending to the real economy.

<sup>62</sup> The same method and parameters (such as confidence levels and holding periods) are used for all financial institutions in calculating the amount of risk they bear. Thus, the amount of risk presented here does not necessarily match that calculated internally by financial institutions themselves as part of their risk management process.

V. Examination of the resilience of the financial system  
 A. Financial institutions' profitability and capital adequacy

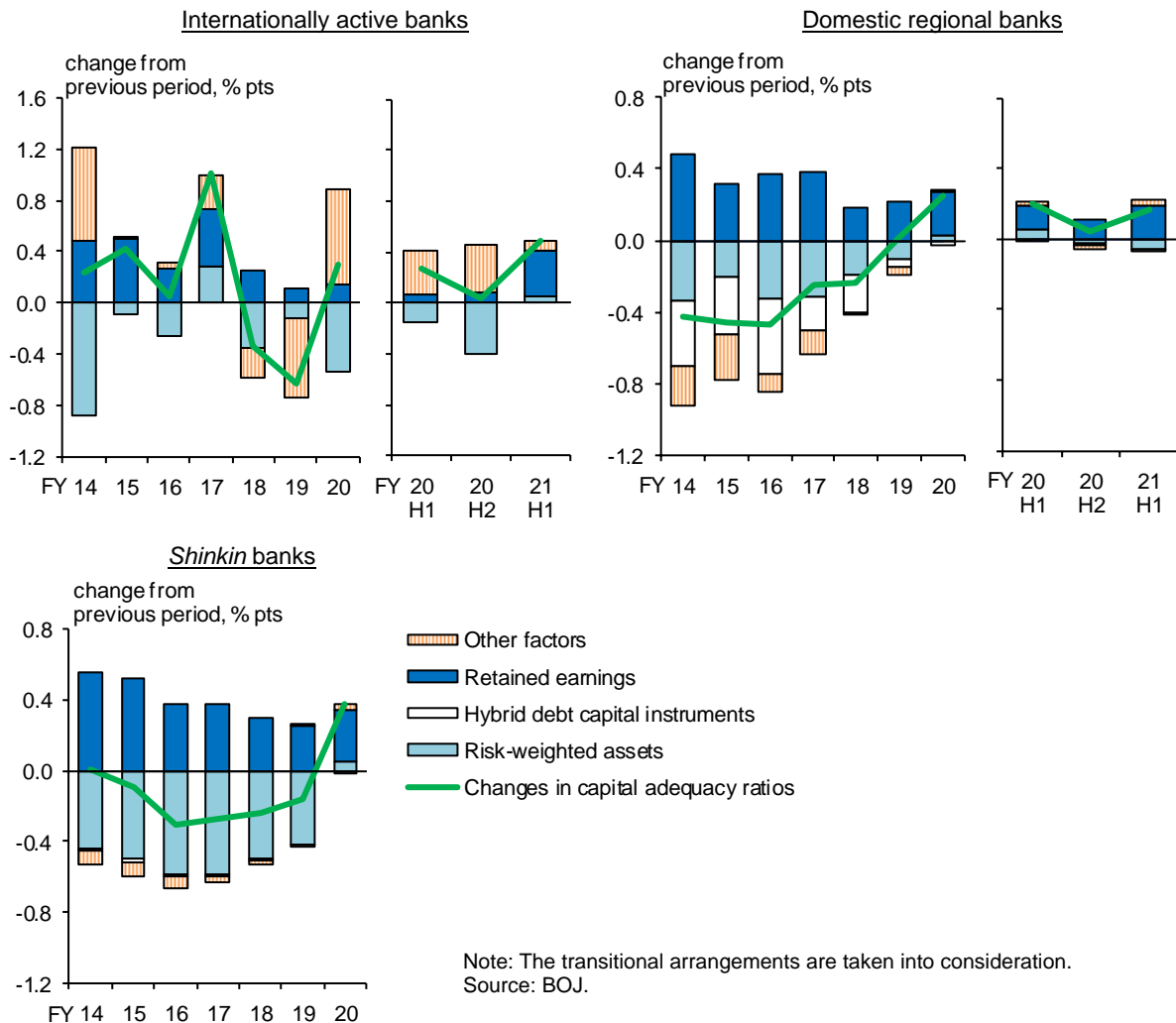
**Chart V-1-3: Financial institutions' capital adequacy ratios**



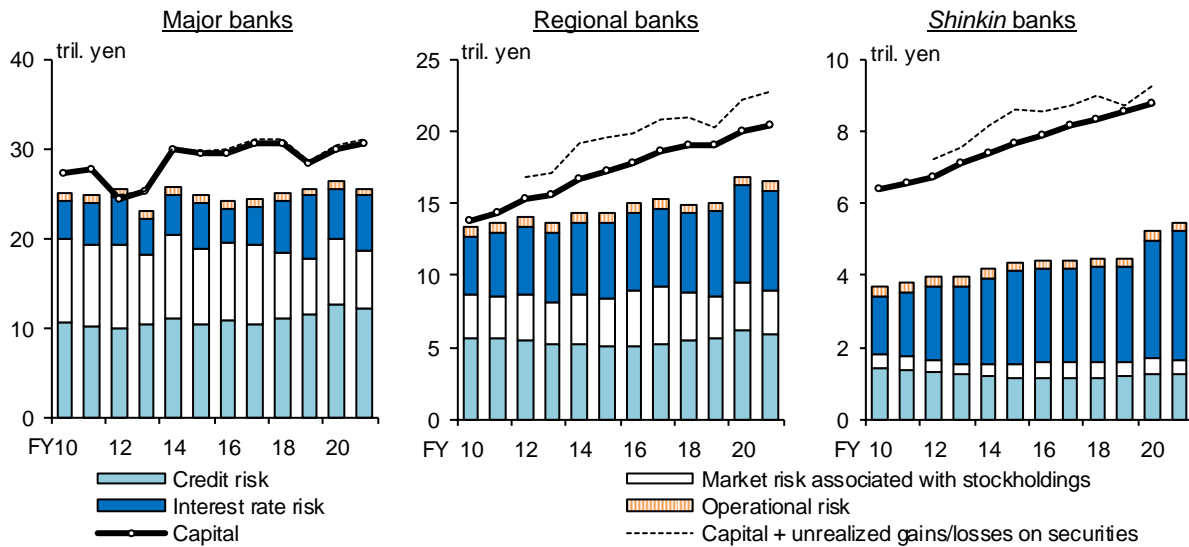
Note: "CAR" indicates the total capital adequacy ratio. Classifications of internationally active banks and domestic regional banks up to fiscal 2012 are as at end-fiscal 2013. The charts are calculated on a consolidated basis. The latest data in the left-hand and middle charts are as at end-September 2021 and the latest data in the right-hand chart are as at end-March 2021. The transitional arrangements are taken into consideration.

Source: BOJ.

**Chart V-1-4: Factors of changes in capital adequacy ratios**



**Chart V-1-5: Risks borne and amount of capital by type of bank**



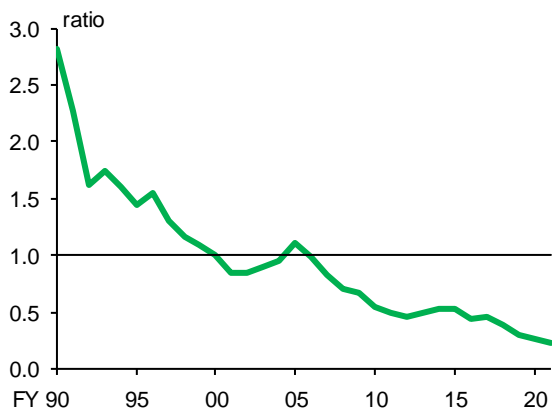
Note: 1. "Credit risk" is unexpected losses with a 99 percent confidence level calculated by referring to the default rates from fiscal 2005 onward and includes foreign currency-denominated assets. See Chart IV-3-5 for the calculation method used for "Market risk associated with stockholdings" and Charts IV-3-1 and IV-3-4 for "Interest rate risk." "Market risk associated with stockholdings" includes risk associated with foreign currency-denominated stockholdings. "Interest rate risk" includes deposit-taking and lending activities and off-balance-sheet transactions. "Operational risk" is assumed to correspond to 15 percent of gross operating profits. "Capital + unrealized gains/losses on securities" is the sum of capital and unrealized gains/losses on securities (tax effects taken into account) for domestic regional banks. Risks are integrated simply by summing the different types of risk.

2. The fiscal 2021 data of each type of risk are estimated based on available data as at March 2022. The fiscal 2021 data of capital and unrealized gains/losses on securities in the left-hand and middle charts are as at end-September 2021.

Source: BOJ.

However, the median of the price-to-book ratios (P/B ratios) of Japanese listed banks has fallen below 0.5 in recent years (Chart V-1-6).<sup>63</sup> The downtrend in P/B ratios in large part can be explained by the downward pressure on financial institutions' profits due to the low interest rate environment and structural factors such as the declining population. Attention needs to be paid to the fact that P/B ratios of below 1 imply that financial institutions' profitability is low and that the stock market considers their capacity to absorb losses to be below the book value of their capital when such institutions' business is valued at market value.

**Chart V-1-6: P/B ratios of banks**



Note: 1. Annual average of median of major financial groups, regional banks, and regional financial groups whose P/B ratios are available in a given period.

2. The figure for fiscal 2021 is estimated based on the data by end-February 2022.

Source: Nikkei Inc., "NEEDS-Financial QUEST."

<sup>63</sup> See Section C of Chapter V and Box 5 in the April 2019 issue of the *Report*.

## B. Macro stress testing

### 1. Risk recognition

With the financial vulnerabilities and risks identified and examined in the previous sections in mind, this section examines the sufficiency of financial institutions' capacity to absorb losses from these financial vulnerabilities and risks, and the resultant impact on financial system stability and financial intermediation activities, using macro stress testing.<sup>64,65</sup>

Looking back at economic activity after the release of the previous *Report*, domestic and overseas economies have generally recovered in line with the average forecasts by research institutions and market expectations at the time of the previous *Report*. However, there remains substantial uncertainty about the course of the pandemic and its impact on the domestic and overseas economies. Specifically, there may remain risks of a resurgence of COVID-19 constraining the real economic activity, particularly of firms that have seen their business conditions deteriorate significantly during the pandemic. Moreover, if U.S. long-term interest rates rise significantly, driven, for example, by developments in U.S. inflation rates, generating substantial pressure for capital outflows from emerging economies, where the pace of recovery has been relatively slow, real economic growth may slow down.

In addition, Japan's financial system appears to be more susceptible to overseas market shocks than in the past. If there is a substantial and rapid adjustment in asset prices in global financial markets, there is a risk of a large negative impact on financial intermediation activities that would generate downward pressure on the domestic and overseas economies.

### 2. Scenarios and their rationale

Based on the risk recognition outlined above, three scenarios are employed for the stress testing in this *Report*: a baseline scenario and two downside scenarios (a "COVID-19 resurgence with rising overseas interest rates scenario" and a "financial stress scenario") (Chart V-2-1).<sup>66</sup> The assumed scenarios are hypothetical and are designed to effectively examine the stress resilience of the financial system, as in stress testing conducted in other jurisdictions. They represent neither the Bank of Japan's outlook for the future economic and financial environment, asset prices, and policy conduct, nor the likelihood of the outcome.

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<sup>64</sup> The simulation utilizes the Financial Macro-econometric Model (FMM) developed by the Financial System and Bank Examination Department of the Bank. For the basic structure of the model, see "The Financial Macro-econometric Model (FMM, March-2020 Version): Overview and Recent Developments," *Financial System Report Annex Series*, August 2020.

<sup>65</sup> The stress testing targets 109 banks and 247 *shinkin* banks (accounting for approximately 80 to 90 percent of total loans outstanding of depository financial institutions). The simulation period is from October-December 2021 through January-March 2025. Some of the economic and financial variables for the scenarios employed in the stress testing can be downloaded from the Bank's website at <https://www.boj.or.jp/en/research/brp/fsr/fsr220421.htm>.

<sup>66</sup> As the situation in Ukraine is highly uncertain, the associated risks are not explicitly incorporated in the scenarios in this *Report*. That said, depending on future developments, potential risks include downward pressure on the domestic and overseas economies, a rise in overseas interest rates due to supply constraints, and adjustments in global financial markets (see Box 5), and to some extent these risks and their possible impact are taken into account in the "COVID-19 resurgence with rising overseas interest rates scenario" and the "financial stress scenario."



Chart V-2-1: Scenarios for simulation

		Real economy	Financial variables
Baseline scenario		Moderate recovery in line with average forecasts of professionals and markets	Unchanged from the level at mid-March 2022
Downside scenarios	COVID-19 resurgence with rising overseas interest rates scenario	Downturn in domestic and overseas economies mainly due to COVID-19 resurgence and a rise in the U.S. long-term interest rate	Historical average reaction to shocks on the real economy as well as financial shocks due to a rise in the U.S. long-term interest rate (+100bps)
	Financial stress scenario	Severe downturn in domestic and overseas economies due to financial shocks	Substantial and rapid financial shocks comparable to the GFC

Note: Long- and short-term interest rates evolve in line with the forward rates under the baseline scenario while they fall to the lowest levels observed until mid-March 2022 under the "financial stress scenario." Under the "COVID-19 resurgence with rising overseas interest rates scenario," they are subject to the shocks due to a rise in the U.S. long-term interest rate (+100bps).

### *Assumptions regarding the real economy*

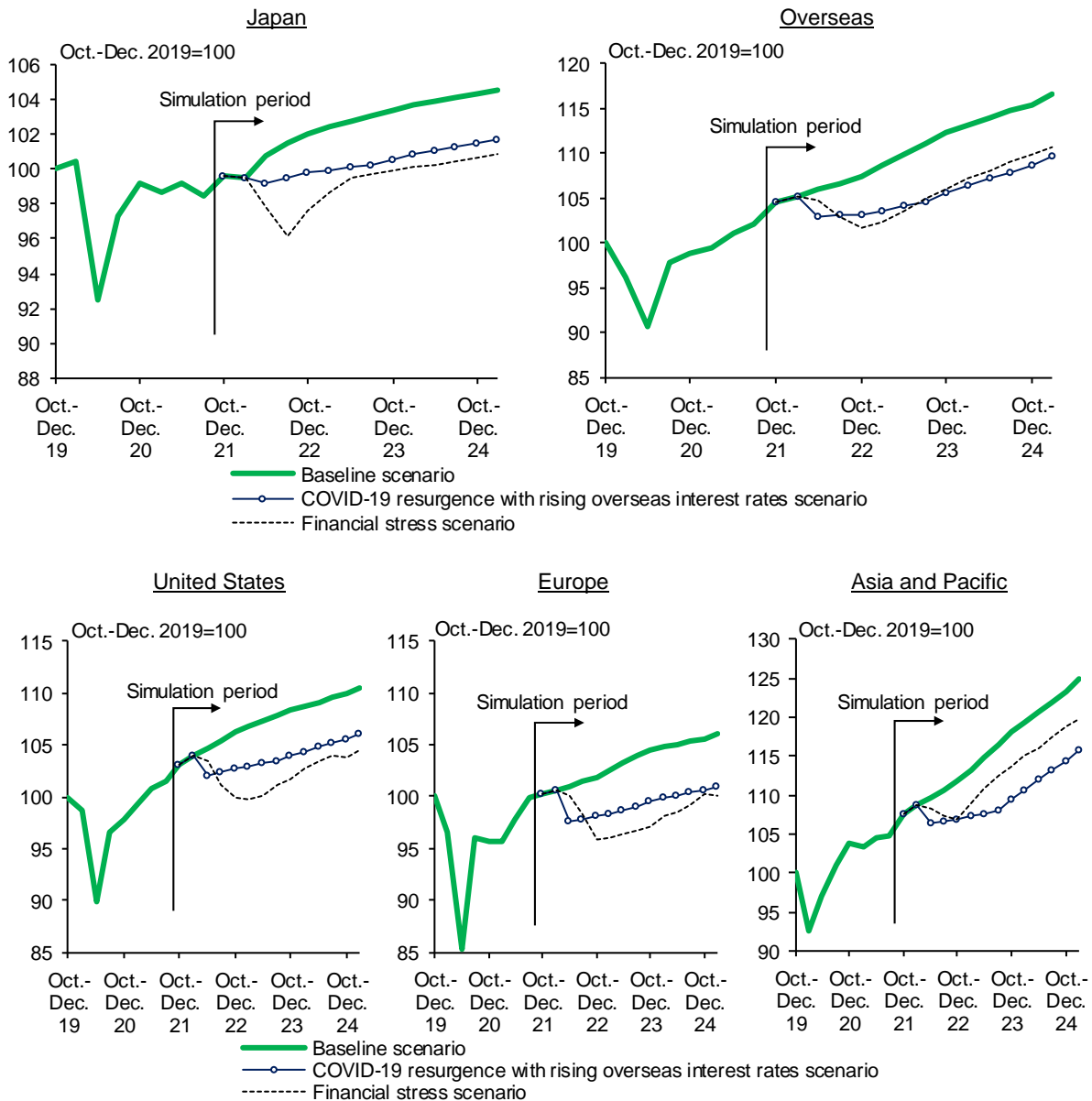
The baseline scenario is based on average forecasts by several research institutions and market expectations as of March 2022. Namely, domestic and overseas economies are assumed to recover as downward pressure stemming from COVID-19 on services consumption and the effects of supply-side constraints wane, while being supported by the increase in external demand, accommodative financial conditions, and the government's economic measures (Charts V-2-2 and V-2-3).

In the "COVID-19 resurgence with rising overseas interest rates scenario," it is assumed that there is a resurgence of COVID-19 infections and that U.S. long-term interest rates rise, driven, for example, by heightened inflation expectations. In this scenario, economic activity is subdued, especially in industries that have been significantly constrained by the spread of COVID-19 since fiscal 2020 as well as in emerging economies, which have been susceptible to pressure for capital outflows (Charts V-2-2 and V-2-3). Specifically, it is assumed that the domestic and overseas economies are hit by an adverse shock in the April-June quarter of 2022 caused mainly by a resurgence in the pandemic and the resultant supply constraints, and that the level of economic activity in the face-to-face services, transportation, and processing industries declines to the average level of the periods from the April-June quarter of 2020, when infections spread in Japan and abroad, until the present. Thereafter, in the first half of the simulation period, the pace of economic recovery in advanced economies is assumed to be half of that in the baseline scenario,

V. Examination of the resilience of the financial system  
 B. Macro stress testing

while the pace of recovery in emerging economies is assumed to fall substantially to a quarter of that in the baseline scenario, due mainly to the impact of a rise in U.S. long-term interest rates.<sup>67,68</sup>

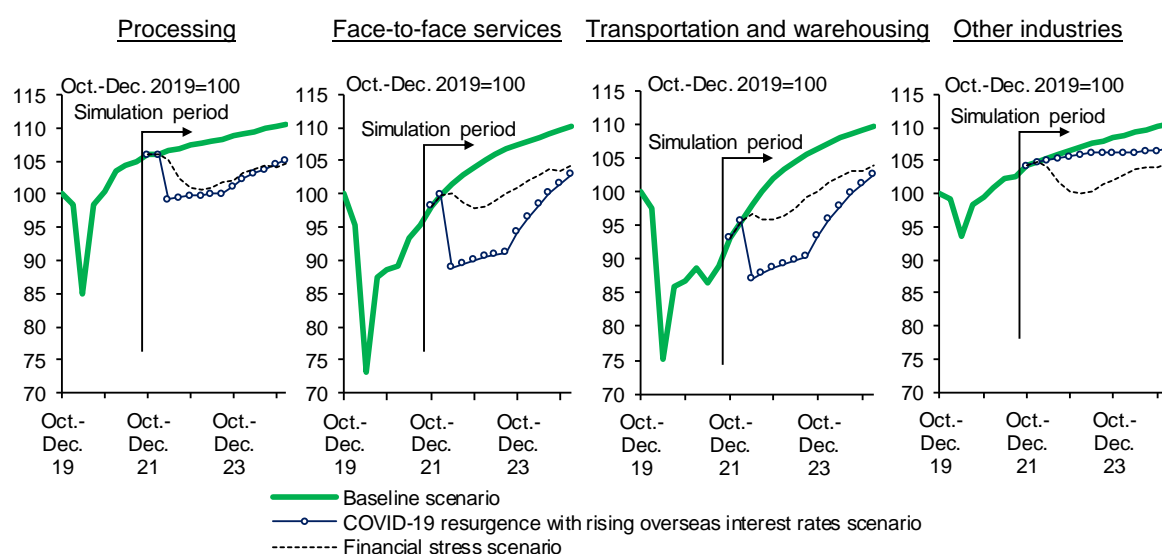
**Chart V-2-2: Economic scenarios for simulation (real GDP)**



Source: BEA; Cabinet Office; Eurostat; Haver Analytics; IMF; Japan Center for Economic Research, "ESP forecast."

<sup>67</sup> As in the "diverging business conditions scenario" in the previous issue of the *Report*, the analysis takes into account the impact of the widening gaps in business conditions across industries on domestic and overseas credit costs by using the credit share of financial institutions' internal rating by industry.

<sup>68</sup> Regarding dispersions in business conditions across industries at home and abroad, it is assumed that the dispersions in the first half of the simulation period are more or less unchanged from those in the April-June quarter of 2022 and become smaller in the second half of the simulation period at a pace almost the same as in the baseline scenario. Moreover, with regard to Japan, it is assumed that the recovery in firms' business conditions diverges across firms within the same industry, and that this situation continues throughout the simulation period to some extent. Specifically, a measure of the dispersion in business conditions (where business conditions are measured in terms of the ratio of operating profits to sales) across firms within the same industry is added as an explanatory variable in the credit cost model, and it is assumed that the dispersion in the April-June quarter of 2022 equals the average dispersion of the period from the January-March quarter of 2020 until the present.

**Chart V-2-3: Economic scenarios for simulation (U.S. real GDP by industry)**

Source: BEA; IMF; Japan Center for Economic Research, "ESP forecast."

The "financial stress scenario" assumes that, as the domestic and overseas economies recover from the impact of COVID-19, there is a substantial and rapid adjustment in global financial markets, which has an adverse impact on financial intermediation activities, leading to sluggish business fixed investment and a widespread deterioration in the employment and income conditions in countries around the world. Specifically, the scenario assumes a situation in which global financial markets experience a significant negative shock in the April-June quarter of 2022 comparable to that during the GFC, which has an adverse impact on financial intermediation activities, putting downward pressure on the real economy at home and abroad (Charts V-2-2 and V-2-3). In this scenario, it is assumed that, from the April-June quarter of 2022 onward, overseas GDP growth follows a path similar to that during the GFC. For Japan's GDP growth, the model-generated value in the wake of a significant negative shock similar to that during the GFC is used.<sup>69</sup>

### *Assumptions regarding the financial variables*

The baseline scenario assumes that currently available information on the outlook for the domestic and overseas economies is appropriately priced in by financial markets. On this basis, it is assumed that interest rates evolve in line with the forward rates implied by the yield curve as of mid-March 2022, and that stock prices, the U.S. dollar/yen exchange rate, and various credit spreads in Japan and abroad are unchanged from their mid-March 2022 levels (Chart V-2-4).

The "COVID-19 resurgence with rising overseas interest rates scenario" assumes that there are both a negative shock to the real economy due to a resurgence in infections and one due to a rise in U.S. interest rates, which in turn have an adverse impact on financial markets (Chart V-2-4). Specifically, changes in short- and long-term interest rates at home and abroad (excluding the U.S. long-term interest rate) and the U.S. dollar/yen exchange rate in the April-June quarter of 2022 are calculated using actual figures from past periods when U.S. interest rates rose.<sup>70</sup> For changes in

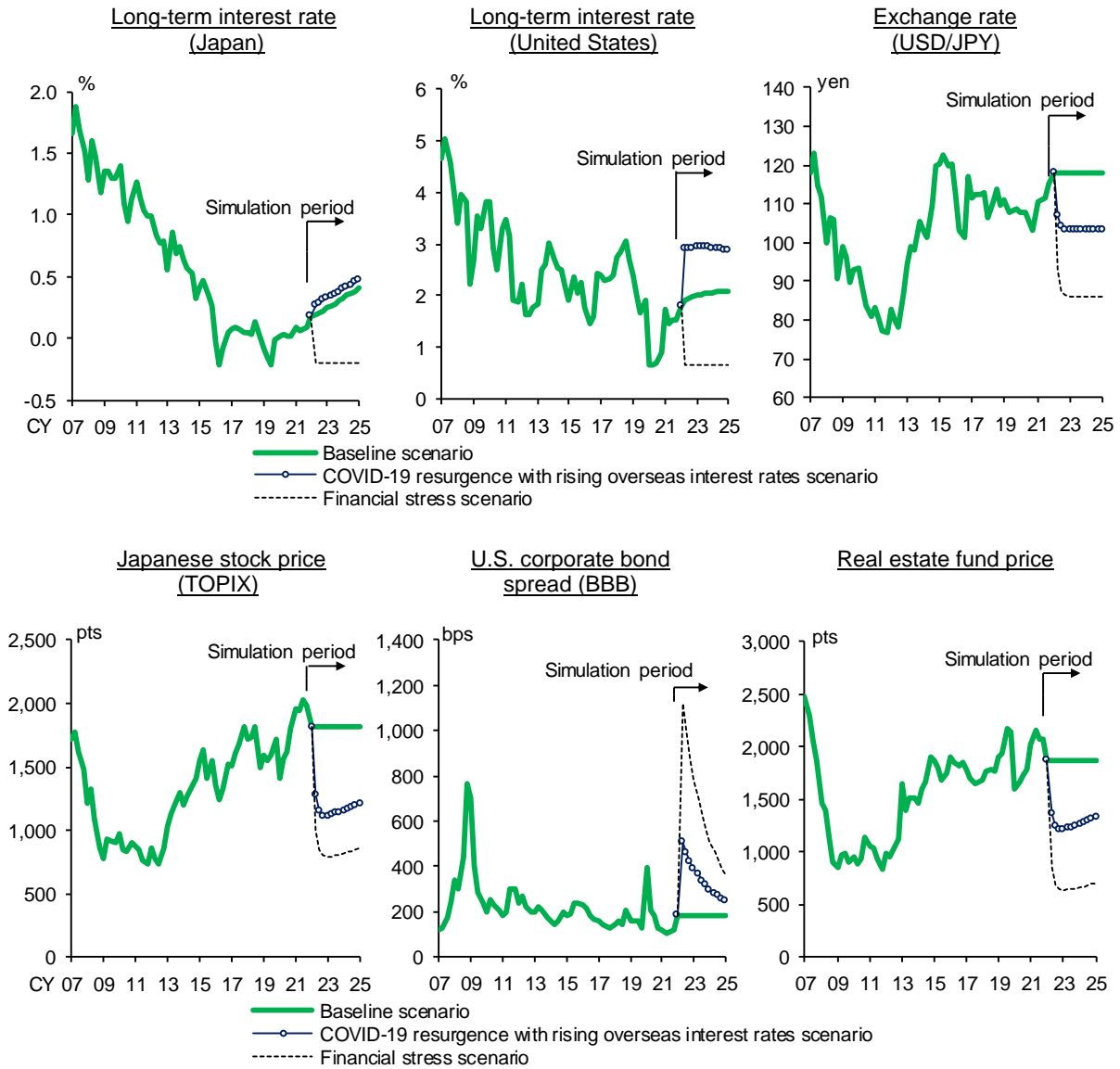
<sup>69</sup> This makes it possible to incorporate into the simulation the aspect that the increase in Japanese financial institutions' capital since the GFC has helped to underpin financial intermediation activities.

<sup>70</sup> The rise in the U.S. long-term interest rate is assumed to be 100 basis points. The figures for the scenario are calculated by multiplying the ratio between the increase in the U.S. long-term interest rate during the "taper tantrum" in May/June 2013 and 100 basis points by the change in a particular financial variable during that time.

V. Examination of the resilience of the financial system  
 B. Macro stress testing

other financial variables (stock prices, various credit spreads, etc.), the sum of changes calculated using actual figures from the past and the average market reactions to a negative shock to the real economy in the past is employed. It is assumed that financial variables, from the July-September quarter of 2022, revert to their long-term averages at a pace in line with historical data.<sup>71</sup>

Chart V-2-4: Financial market scenarios for simulation



Note: Long-term interest rate indicates 10-year government bond yield. Real estate fund price indicates the TSE REIT Index. Source: Bloomberg; FRB; Haver Analytics; Ministry of Finance, "Interest rate."

In the "financial stress scenario," it is assumed that global financial markets experience a substantial and rapid adjustment in the April-June quarter of 2022 comparable to that during the

<sup>71</sup> Note that the pace at which financial variables revert to their long-term averages after a stress event tends to be faster than the pace estimated using data that include observations for normal times. This pattern likely reflects the fact that substantial financial market stress tends to be followed by policy responses. However, to assess the impact of stress excluding the impact of the associated policy response, the downside scenarios assume that the pace at which financial variables revert to their long-term averages is the same as the average pace in the past.

GFC (Chart V-2-4).<sup>72,73</sup> Meanwhile, for many financial variables, particularly risky financial assets, the degree of adjustment assumed in this scenario is larger than in the "COVID-19 resurgence with rising overseas interest rates scenario."

### *Assumptions regarding measures to support corporate financing*

Regarding the corporate financing support measures, the impact of the policy measures taken by the government and the Bank of Japan as well as lending by financial institutions conducted so far is taken into account, also with consideration of the actual pace of budget spending.<sup>74</sup> Namely, in estimating credit costs, this *Report* assumes that, as a result of the cash payments by the government (including those scheduled for fiscal 2022) underpinning corporate profits, the deterioration in firms' ICR, which is an indicator representing their debt servicing capacity, is mitigated while the cash payments are made.<sup>75</sup>

With regard to loans extended since April 2020 as part of the corporate financing support measures, it is assumed that the effectively interest-free loans guaranteed by credit guarantee corporations increase financial institutions' net interest income, while credit costs do not rise even if defaults occur.<sup>76</sup> In addition, the risk-weighted assets for such loans are assumed to not increase. As in Section A of Chapter IV, it is assumed that the grace period for principal of the effectively interest-free loans is one year and the repayment period is five years, and that the loans are repaid gradually in line with this timeline.<sup>77</sup> In addition, the simulation assumes that interest payments for these loans are made from fiscal 2023, thus lowering firms' ICR. While other loans are similar to the effectively interest-free loans, in that they lead to an increase in financial institutions' net interest income, they differ in that they could lead to an increase in credit costs through a rise in firms'

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<sup>72</sup> Reflecting the growing importance of investment funds in the global financial system in recent years, the scenario assumes a situation in which, as seen during the market turmoil in March 2020, the spreads of bonds with a relatively high credit rating can widen to a greater degree than during the GFC. Specifically, for U.S. corporate bonds and securitized products, it is assumed that the spread on high-rated bonds widens to a greater extent than during the GFC, by the ratio of the widening in spreads during the market turmoil in March 2020 to that during the GFC for low-rated bonds, which is about three for U.S. corporate bonds, for example, multiplied by the widening in spreads for each rating category in March 2020.

<sup>73</sup> U.S. dollar funding premiums for Japanese banks overall are also assumed to increase to a level comparable to that during the GFC.

<sup>74</sup> The effects of policy measures that had not been finalized by the time of preparing this *Report* are not taken into account. Moreover, measures to support corporate financing taken by governments in other countries are also not taken into account.

<sup>75</sup> In the estimation of credit costs, the effects of the cash payments in fiscal 2021 and 2022 by firm size are incorporated. The cash payments mainly consist of the employment adjustment subsidies program, one-off support payments and monthly support payments for SMEs, and cooperation fees for shortening business hours (all estimated based on the budget plans as of the end of February 2022). Meanwhile, the amount of cash payments from fiscal 2023 onward is assumed to be zero.

<sup>76</sup> Specifically, the outstanding balances of financial institutions' loans to domestic firms as of the end of September 2021 are divided into loans extended as part of measures to support corporate financing and other loans, and the former are further subdivided into effectively interest-free loans and regular loans extended as part of measures to support corporate financing. Financial institutions' outstanding balances of effectively interest-free loans as of the end of September 2021 are estimated so as to be consistent with changes in the macro-level outstanding balance of loans guaranteed by credit guarantee corporations, while also referring to the actual credit guarantees to individual financial institutions provided by credit guarantee corporations. On the other hand, the outstanding balances of regular loans extended as part of measures to support corporate financing are calculated as the amount of each financial institution's outstanding balance of loans to domestic firms as of the end of September 2021 that exceed the amount predicted by the model minus the outstanding balance of effectively interest-free loans.

<sup>77</sup> It is assumed, for simplicity, that throughout the simulation period no repayments are made for regular loans extended as part of measures to support corporate financing.

V. Examination of the resilience of the financial system  
 B. Macro stress testing

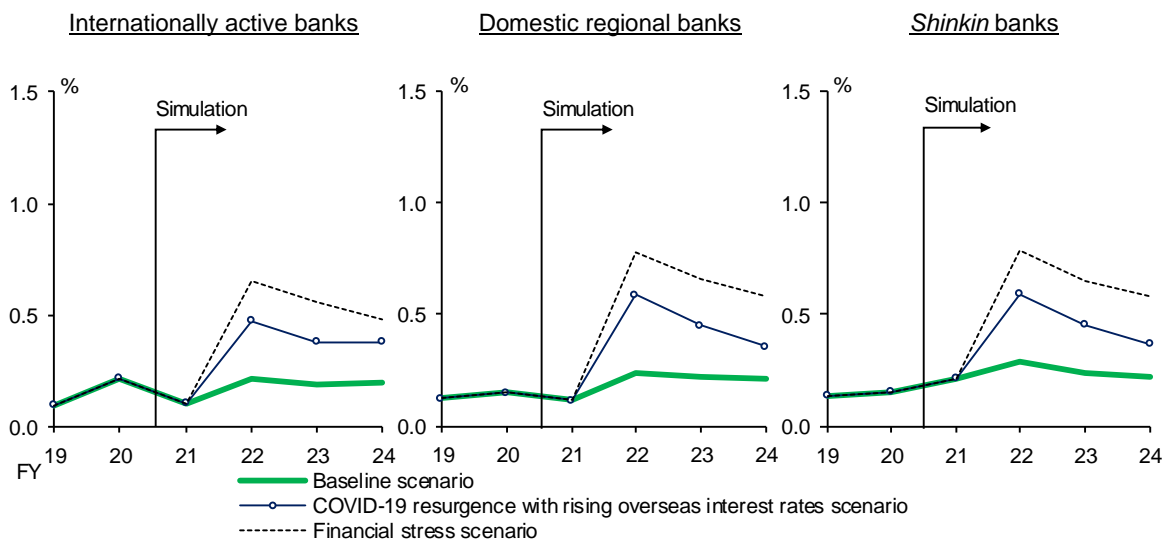
leverage and a decrease in their ICR, and that they could lower capital adequacy ratios through an increase in risk-weighted assets.

### 3. Results of stress testing

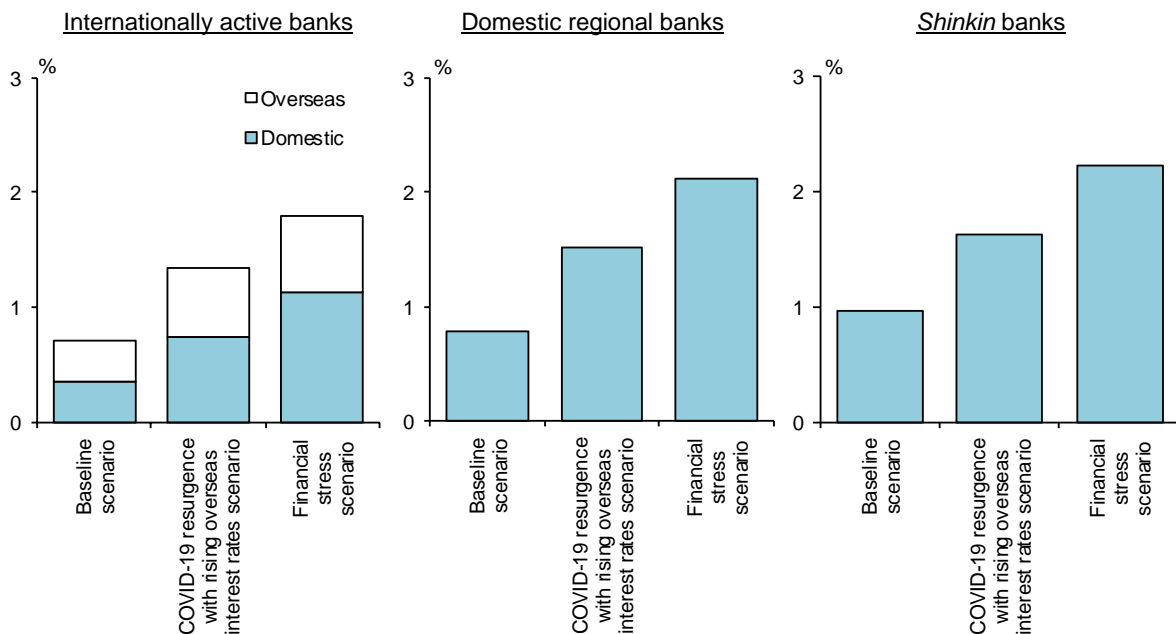
#### Credit costs

The baseline scenario shows that the credit cost ratios for all types of banks are more or less unchanged from the current level, and the average credit cost ratios for the four years from fiscal 2021 to 2024 on an annualized basis are about 0.2 percent (Charts V-2-5 and V-2-6).<sup>78</sup>

**Chart V-2-5: Credit cost ratios**



**Chart V-2-6: Credit cost ratios (4-year cumulative totals)**



Note: Credit cost ratios are cumulative totals of fiscal 2021 to 2024.

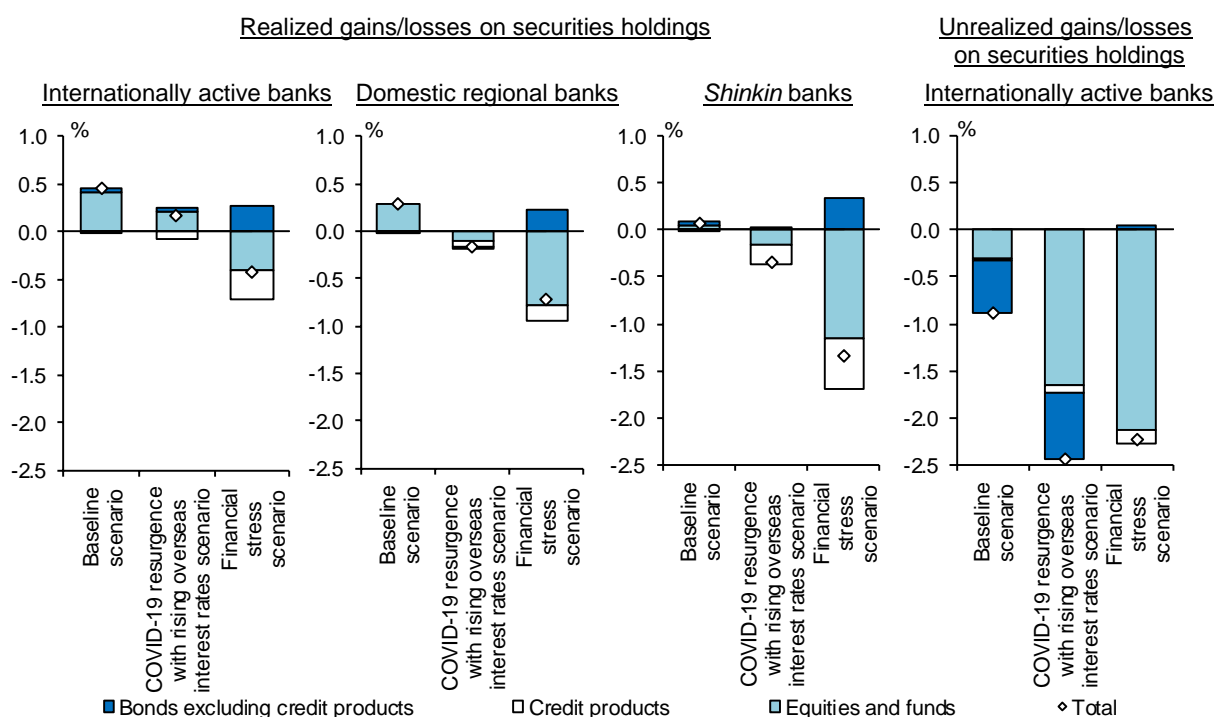
<sup>78</sup> Whereas the ratio of loans covered by collateral, guarantees, or provisions, which is used to estimate credit costs, was previously assumed to be unchanged from the end of the actual period, in this *Report* the ratio is specified as increasing with land prices.

In both downside scenarios, credit cost ratios increase more than in the baseline scenario for all types of banks. Moreover, for all bank types, credit cost ratios are higher in the "financial stress scenario" than in the "COVID-19 resurgence with rising overseas interest rates scenario."

### Realized and unrealized gains/losses on securities holdings<sup>79</sup>

In the baseline scenario, the cumulative realized gains/losses on securities holdings over the four years are positive for all bank types (Chart V-2-7).<sup>80</sup> In the "COVID-19 resurgence with rising overseas interest rates scenario," all bank types either make smaller gains than in the baseline scenario or make losses, reflecting, for example, the fall in stock prices and the widening of credit spreads. In the "financial stress scenario," the cumulative realized losses on securities holdings are fairly large on the whole for all bank types: although losses are mitigated by gains from the sale of bonds due to the lower interest rates than in the other scenarios, there are large impairment losses due to the greater decline in stock prices and the larger widening of credit spreads.

**Chart V-2-7: Realized and unrealized gains/losses on securities holdings**



Note: 1. Realized gains/losses on securities holdings are cumulative totals of fiscal 2021 to 2024. Unrealized gains/losses on securities holdings are changes from the end of fiscal 2020 to the end of fiscal 2024 and take tax effects into account.

2. The charts indicate the ratio relative to risk-weighted assets at the end of fiscal 2020.

Turning to unrealized gains/losses on securities holdings in terms of changes from the end of fiscal 2020 through the end of fiscal 2024, those at internationally active banks decline in the baseline

<sup>79</sup> In this *Report*, the coverage of some major banks' investment in foreign funds and alternative investments has been expanded to include real estate funds, hedge funds, and private equity funds.

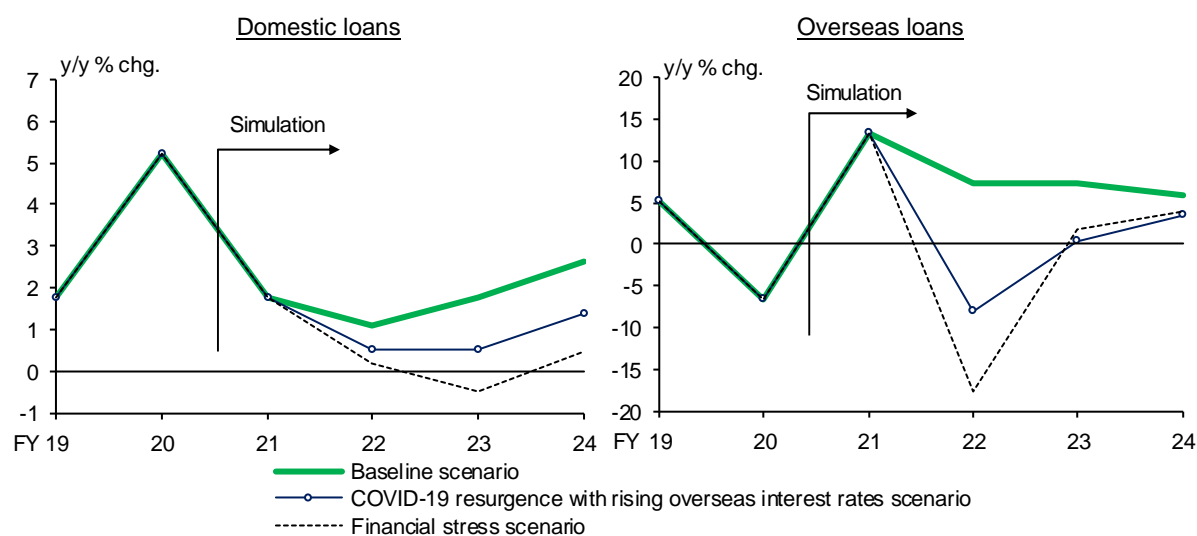
<sup>80</sup> It is assumed that financial institutions realize gains on securities holdings basically by the same amount as the average for the past three years. Gains from the sale of securities are zero for financial institutions that have exhausted all unrealized gains. With respect to the percentage of unrealized gains on bondholdings that are realized in each fiscal year, the median of the percentage in the fiscal year in which each financial institution made the largest gains from the sale of bonds is used as the upper limit. In contrast, until the previous *Report*, it was assumed that all unrealized gains on bondholdings could be realized in the event that unrealized gains on other securities, for example, stockholdings, were exhausted.

scenario due to the fall in bond prices resulting from the rise in interest rates (Chart V-2-7).<sup>81</sup> In the "COVID-19 resurgence with rising overseas interest rates scenario," the losses are greater than in the baseline scenario, reflecting the decline in stock prices and the larger rise in interest rates. In the "financial stress scenario," the total losses are more or less the same as in the "COVID-19 resurgence with rising overseas interest rates scenario": although the losses on holdings of stocks and funds are larger due to the greater decline in stock prices, there is a gain on bondholdings due to the fall in interest rates.

### Net interest income

Domestic and overseas loans outstanding continue to show positive growth throughout the simulation period in the baseline scenario as the economic activity recovers at home and abroad (Chart V-2-8).<sup>82</sup> The growth rates in domestic loans outstanding in the two downside scenarios fall below the baseline scenario. In the "financial stress scenario," the annual rate of change in overall domestic loans outstanding turns negative in fiscal 2023, due mainly to a decline in the demand for funds amid the severe downturn in the domestic and overseas economies and a deterioration in lending capacity amid lower capital adequacy ratios. Moreover, the annual rate of change in overseas loans outstanding turns negative in fiscal 2022 in the two downside scenarios, mainly due to weaker demand for funds amid the downturn in the overseas economies. In the "financial stress scenario," the significant decline in the yen-denominated value of overseas loans due to the appreciation of the yen leads to a greater rate of decline than in the "COVID-19 resurgence with rising overseas interest rates scenario."

**Chart V-2-8: Loans outstanding (total of financial institutions)**



Lending margins continue to shrink moderately for all types of banks in the baseline scenario amid the continued slack in the domestic loan market (Chart V-2-9). In the "COVID-19 resurgence with rising overseas interest rates scenario," the lending margins of domestic regional banks and *shinkin* banks are larger than in the baseline scenario, reflecting the rise in credit spreads. On the other

<sup>81</sup> Unrealized gains/losses on securities holdings only affect the regulatory capital adequacy ratios of internationally active banks.

<sup>82</sup> The sensitivity of lending to economic conditions in this *Report* is estimated excluding the effects of temporary increases in loans outstanding, including the withdrawal of funds from committed lines, observed during the GFC in 2008 and the early stage of the spread of COVID-19 in 2020. As a result, the sensitivity of domestic lending to economic conditions is roughly the same as in previous *Reports*, while the sensitivity of overseas lending is slightly lower.



hand, the overall lending margins of internationally active banks are lower than in the baseline scenario, which to a large extent is caused by a contraction in overseas lending margins due to the deterioration of overseas economies. In the "financial stress scenario," reflecting the narrower spread between short- and long-term interest rates, the lending margins of internationally active banks are even lower than in the "COVID-19 resurgence with rising overseas interest rates scenario," while those of domestic regional banks and *shinkin* banks are slightly lower than in the baseline scenario.

Against this background, the net interest income of internationally active banks in the baseline scenario increases moderately throughout the simulation period due to the increase in overseas loans, while that of domestic regional banks and *shinkin* banks is more or less unchanged (Chart V-2-10). On the other hand, in the "COVID-19 resurgence with rising overseas interest rates scenario," the net interest income of internationally active banks, which see a large decline especially in overseas loans outstanding, decreases substantially compared to the baseline scenario, while the decline for domestic regional banks and *shinkin* banks is limited. In the "financial stress scenario," with interest rates falling, the decline in net interest income is relatively large for all bank types as financial institutions realize gains on bondholdings and reinvest the proceeds at lower interest rates.<sup>83</sup>

Chart V-2-9: Lending margin

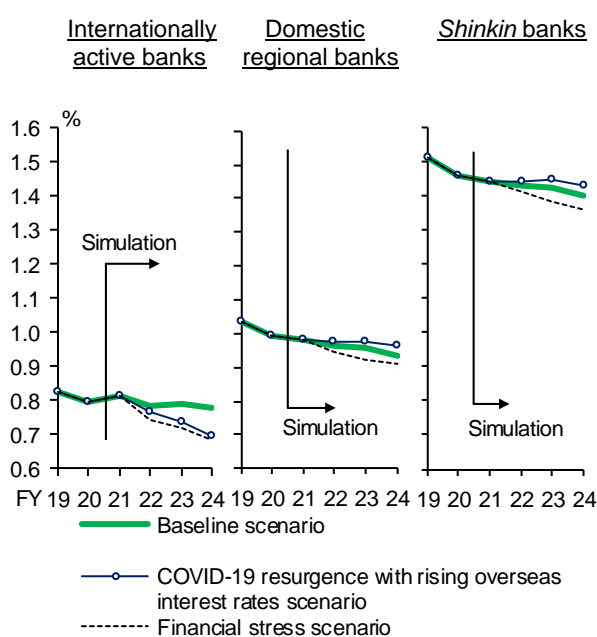
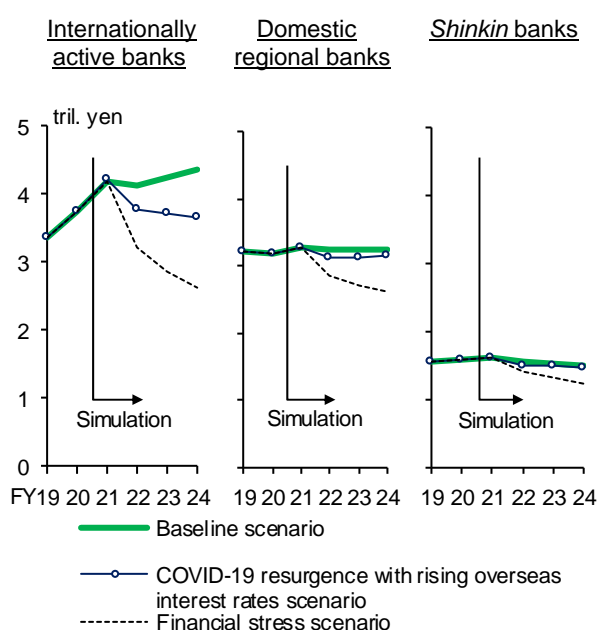


Chart V-2-10: Net interest income



### Net income

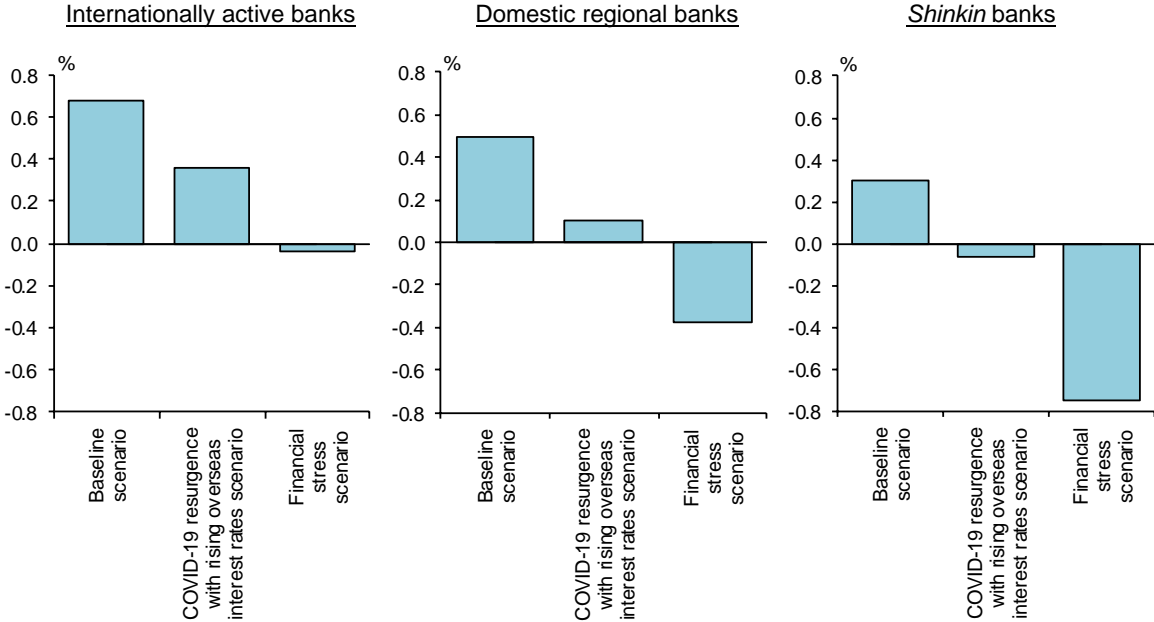
Based on the above results, the cumulative net income over the four years is positive for all bank types in the baseline scenario (Chart V-2-11). In the "COVID-19 resurgence with rising overseas interest rates scenario," the cumulative net income of internationally active banks and domestic regional banks is smaller than in the baseline scenario and that of *shinkin* banks is negative, mainly reflecting the higher credit costs, the smaller realized gains/larger realized losses on securities

<sup>83</sup> Until the previous *Report*, it was assumed that, when bonds were sold to lock in gains, financial institutions would repurchase bonds with the same coupon yields as the bonds that were just sold. In this *Report*, however, the assumption has been changed so that the yields on the bonds purchased with the proceeds are in line with the level of interest rates at the time of the purchase.

V. Examination of the resilience of the financial system  
 B. Macro stress testing

holdings, and the lower net interest income. In the "financial stress scenario," the negative impact of these factors is even larger for all bank types, so that the net income of internationally active banks and domestic regional banks turns negative, and the negative net income of *shinkin* banks is even larger than in the "COVID-19 resurgence with rising overseas interest rates scenario."

**Chart V-2-11: Net income (4-year cumulative totals)**



Note: The charts indicate the ratio of net income to total assets. The net incomes are cumulative totals of fiscal 2021 to 2024.

**Capital adequacy ratios**

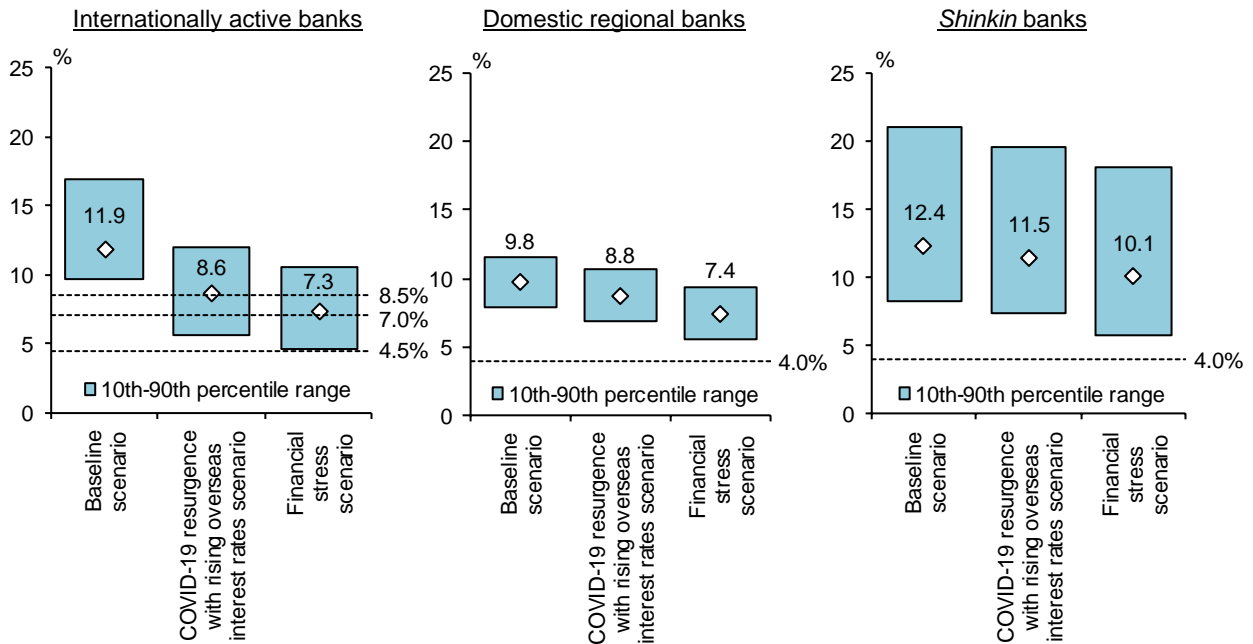
The capital adequacy ratios of internationally active banks decline slightly and those of other types of banks are generally unchanged from fiscal 2020 through fiscal 2024, the final fiscal year of the simulation, in the baseline scenario.<sup>84</sup> Looking at factors underlying changes in capital adequacy ratios, for all types of banks, credit costs and increases in risk-weighted assets push down the ratios, while PPNR excluding trading income pushes up the ratios. Further, the deterioration in unrealized gains/losses on securities holdings pushes down the ratios of internationally active banks (Charts V-2-12 and V-2-13).<sup>85</sup>

In the two downside scenarios, capital adequacy ratios in fiscal 2024 are lower than in the baseline scenario for all bank types. In detail, in the "COVID-19 resurgence with rising overseas interest rates scenario," the ratios on average remain above regulatory levels for all types of banks. On the other hand, in the "financial stress scenario," the average CET1 ratio of internationally active banks falls below 8 percent, and that of a fair number of financial institutions declines to a level that breaches the capital buffer ratios, which are set in the range of 7 to 8.5 percent depending on each financial institution's importance in the financial system (Chart V-2-12).

<sup>84</sup> It is assumed that the payout ratio equals the average payout ratio of the past three years when a financial institution's net income is positive and zero when its net income is negative.

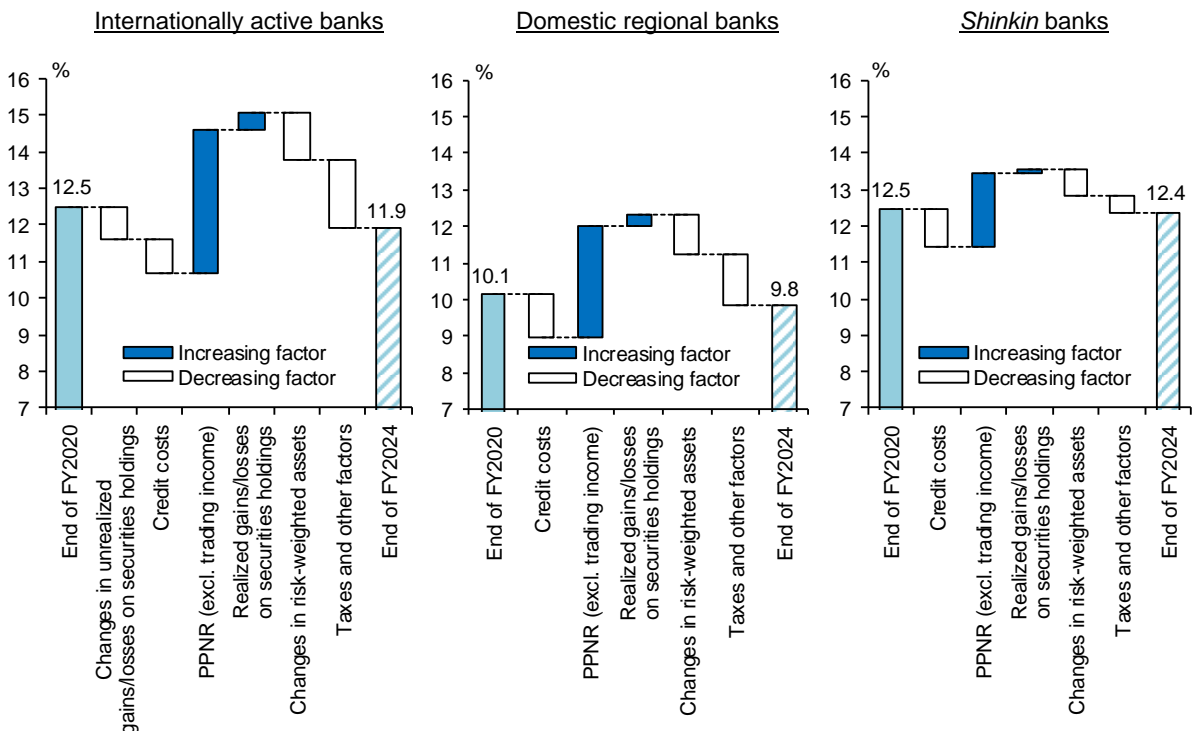
<sup>85</sup> Regarding the foreign currency translation adjustments for overseas subsidiaries included in "taxes and other factors" underlying changes in capital adequacy ratios, the values were assumed in previous *Reports* to move in line with changes in the USD/JPY exchange rate. In this *Report*, however, they are assumed to fluctuate based on the estimates of their sensitivity to exchange rate changes.

**Chart V-2-12: Capital adequacy ratios (fiscal 2024)**



Note: 1. The left-hand chart shows the CET1 capital ratios of internationally active banks. The middle and right-hand charts show the core capital ratios of domestic regional banks and *shinkin* banks. The transitional arrangements for domestic regional banks and *shinkin* banks are taken into consideration.  
 2. Markers in the charts indicate the total of financial institutions for each type of bank.

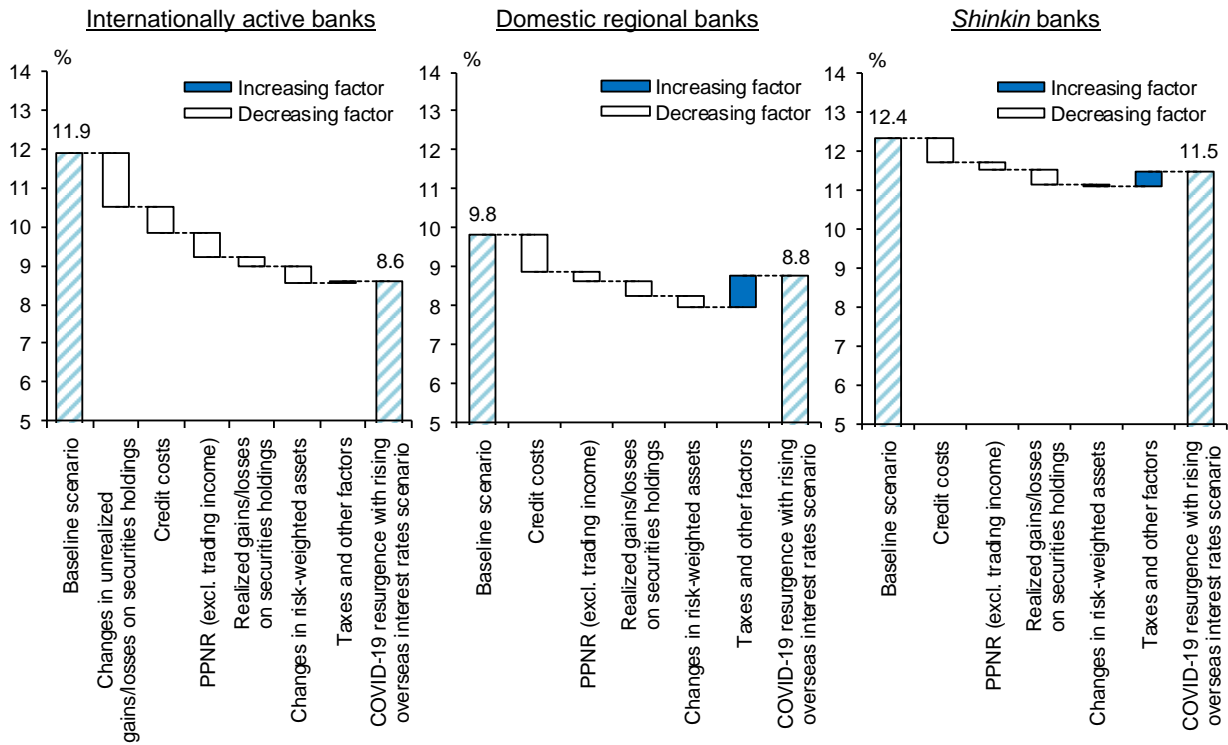
**Chart V-2-13: Decomposition of CET1 capital ratio and core capital ratio (baseline scenario)**



Note: 1. The charts indicate the contribution of each factor to the difference between the capital adequacy ratios at end-March 2021 and the end of the simulation period (as at end-March 2025) under the baseline scenario.  
 2. The left-hand chart shows the CET1 capital ratio of internationally active banks. The middle and right-hand charts show the core capital ratio of domestic regional banks and *shinkin* banks. The transitional arrangements for domestic regional banks and *shinkin* banks are taken into consideration (the same applies to Charts V-2-14 and V-2-15).  
 3. "Changes in unrealized gains/losses on securities holdings" takes tax effects into account (the same applies to Charts V-2-14 and V-2-15).  
 4. "Taxes and other factors" in the left-hand chart includes foreign currency translation adjustments, dividends, and CET1 regulatory adjustments of internationally active banks (the same applies to Charts V-2-14 and V-2-15). "Taxes and other factors" in the middle and right-hand charts includes dividends of domestic regional banks and *shinkin* banks (the same applies to Charts V-2-14 and V-2-15).

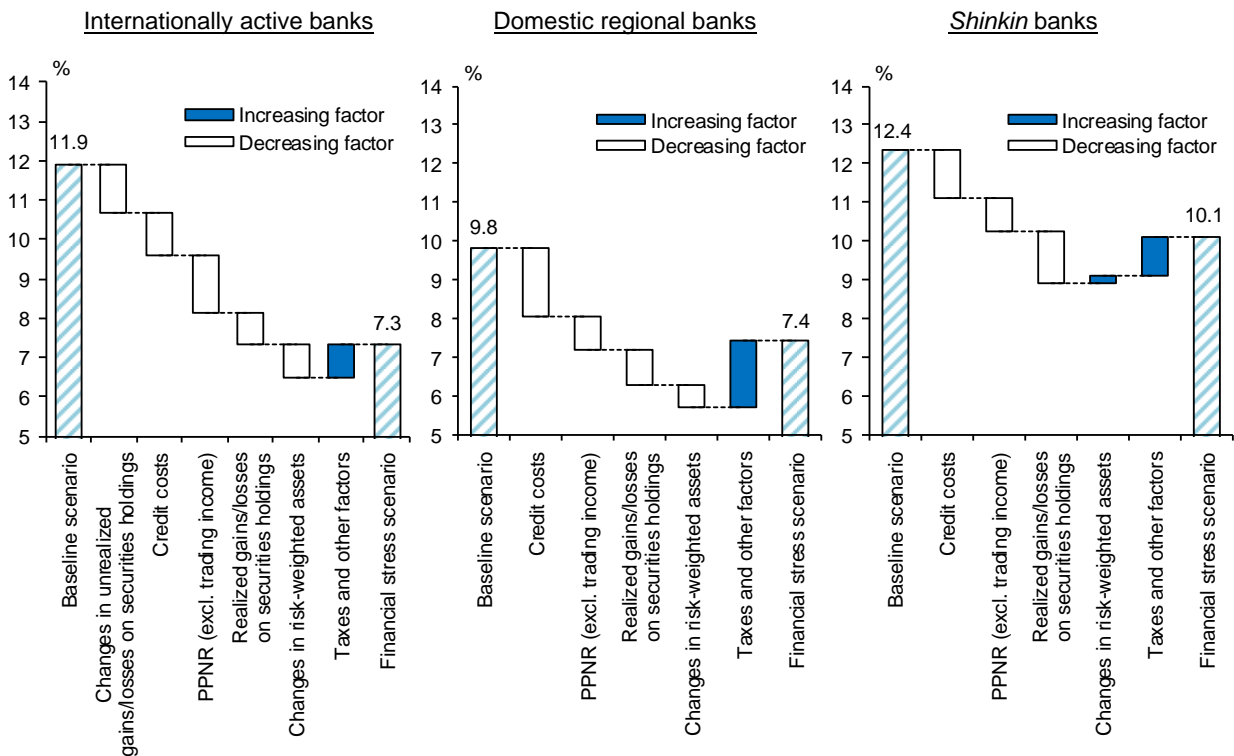
V. Examination of the resilience of the financial system  
 B. Macro stress testing

**Chart V-2-14: Decomposition of CET1 capital ratio and core capital ratio (COVID-19 resurgence with rising overseas interest rates scenario)**



Note: The charts indicate the contribution of each factor to the difference between the capital adequacy ratios at the end of the simulation period (as at end-March 2025) under the baseline scenario and the "COVID-19 resurgence with rising overseas interest rates scenario."

**Chart V-2-15: Decomposition of CET1 capital ratio and core capital ratio (financial stress scenario)**



Note: The charts indicate the contribution of each factor to the difference between the capital adequacy ratios at the end of the simulation period (as at end-March 2025) under the baseline scenario and the "financial stress scenario."

Looking at the factors underlying the lower capital adequacy ratios in fiscal 2024 relative to the baseline scenario, in the "COVID-19 resurgence with rising overseas interest rates scenario," the declines in unrealized gains/losses on securities holdings and in PPNR excluding trading income as well as the increase in credit costs make a major contribution in the case of internationally active banks; in the case of domestic regional banks and *shinkin* banks, however, the increase in credit costs makes the largest contribution (Chart V-2-14). In the "financial stress scenario," credit costs, PPNR excluding trading income, and realized gains/losses on securities holdings for all bank types have an even larger negative impact than in the "COVID-19 resurgence with rising overseas interest rates scenario" (Chart V-2-15).

#### 4. Evaluation of the resilience of the financial system

In summary, the stability of Japan's financial system will be maintained if the economy recovers in line with the average of current forecasts.<sup>86</sup> Reasons include that financial institutions have become more robust by building up capital, non-financial firms on the whole have maintained a sound financial position since the GFC, and, on this basis, measures to support corporate financing have been highly effective.

Japan's financial system is likely to remain highly robust and financial intermediation is expected to continue operating smoothly even in the event of a resurgence of COVID-19 and a simultaneous rise in U.S. long-term interest rates leading to downward pressure on the real economy at home and abroad and an adjustment in global financial markets.

However, there is a risk that, if there is a substantial and rapid adjustment in financial markets comparable to that of the GFC and a simultaneous deterioration in global economies, a decline in financial institutions' capital adequacy ratios could have a negative impact on financial intermediation activities and exert downward pressure on the real economy. In addition to the future course of the pandemic, uncertainty regarding global financial markets remains high, and the risk of a substantial and rapid adjustment in asset prices warrants attention.

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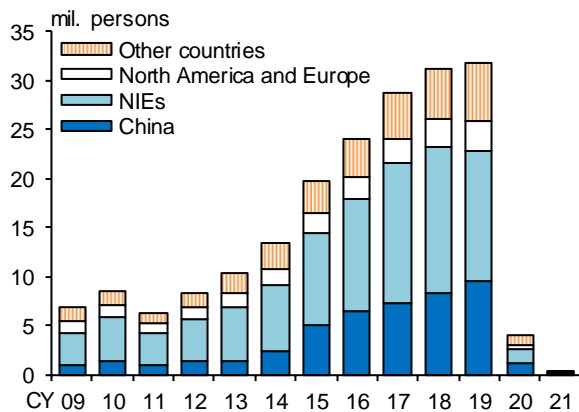
<sup>86</sup> However, the impact of policy responses, including that on credit costs, should be regarded as subject to a considerable margin of uncertainty. For example, an increase in lending to low-return borrowers due to policy responses may lead to an increase in credit costs and a decrease in financial institutions' profits from a medium- to long-term perspective.

### Box 1: Risks related to the real estate market in the wake of the pandemic

As discussed in Section E of Chapter IV, there has been no major adjustment in the real estate market as a whole since the start of the pandemic. However, if the current pandemic leads to changes in the structure of the domestic economy and population movements in the future, this may result in adjustments in the real estate market and potentially affect Japan's financial system. This box examines the nature of two such risks and their impact on real estate prices.

The first risk is changes in the structure of the profitability of land use. As the global flow of people came to a halt following the outbreak of the pandemic, the number of visitors to Japan, particularly the number of foreign tourists, which had been growing at a steady pace, fell substantially and has remained at a low level since then (Chart B1-1). The disappearance of spending demand by inbound visitors is likely to put downward pressure on current and future earnings from land use and could have a considerable impact on land values. Looking at developments in land values in tourist areas since the start of the pandemic based on the location information of standard sites in the "Land Market Value Publication," the closer sites are to tourism resources, the more their land values have tended to fall, and substantial land value declines have been seen in some areas (Chart B1-2).

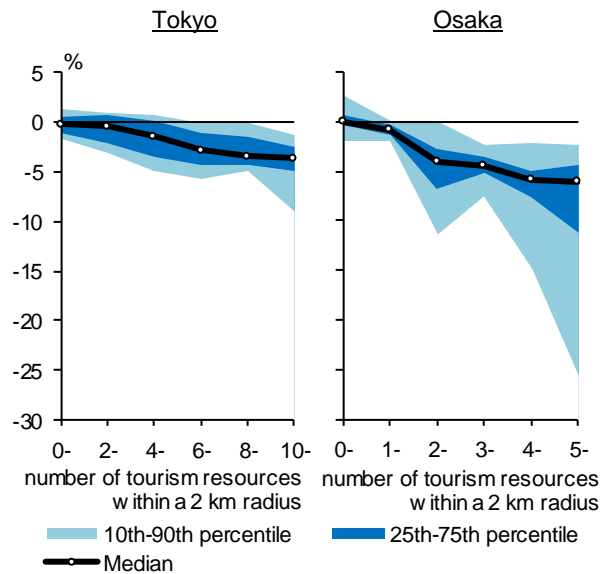
**Chart B1-1: Developments in the number of inbound visitors**



Note: "North America and Europe" includes the United States, Canada, the United Kingdom, France, and Germany.

Source: Japan National Tourism Organization (JNTO).

**Chart B1-2: Changes in land values around tourism resources**

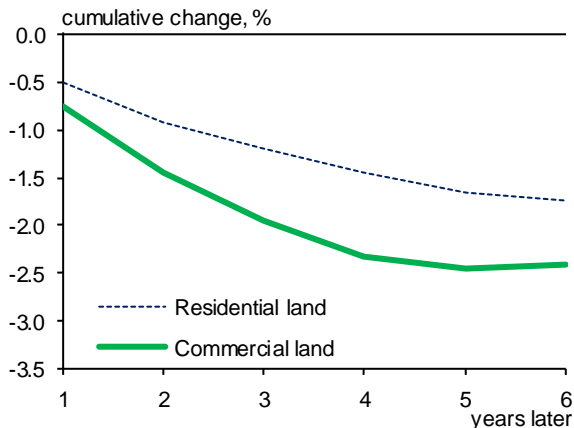


Note: Changes in land values are based on the location of commercial land aggregated in terms of the number of tourism resources within a 2 km radius. The charts indicate changes from 2020 to 2022.

Source: Ministry of Land, Infrastructure, Transport and Tourism, "Land Market Value Publication," "Tourism Resource Data."

In this context, a quantitative study using the data on standard sites in the "Land Market Value Publication" and municipality-level data on taxable income, controlling for differences in land characteristics, shows that a permanent decline in revenue as measured by taxable income in the municipality where the standard site is located leads to a subsequent persistent decline in land values (Chart B1-3). Given the potential that pandemic causes major changes in the structure of the profitability of land use, not only through a decline in inbound tourism demand but also through the spreading of e-commerce, these results suggest that changes in the structure of land use profitability may spill over to real estate prices, possibly with a lag.

**Chart B1-3: Effects of a 1 percentage point decline in the changes in income on land values**

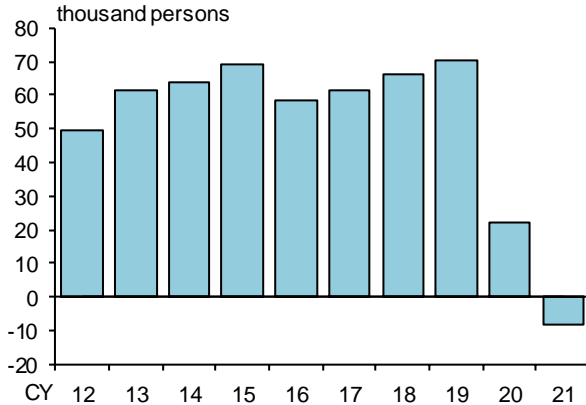


Note: The estimation period is from 2001 to 2021. The chart shows the response of land values to a 1 percentage point decline in the growth in taxable income per capita. Estimated using local projection.

Source: Ministry of Internal Affairs and Communications; Ministry of Land, Infrastructure, Transport and Tourism.

The second risk is associated with changes in regional demographics. The pandemic has changed population flows. For example, the 23 Tokyo wards, which had previously experienced continuous population inflows, started to see net population outflows (Chart B1-4). Moreover, in the long term, it is expected that Japan's population and number of households will follow a downward trend. Based on the study that uses the data on standard sites in the "Land Market Value Publication" as above, as well as municipality-level population data, a permanent decline in the population leads to a persistent decline in land values -- controlling for differences in land characteristics -- as in the case of the aforementioned changes in structure of land use profitability (Chart B1-5).

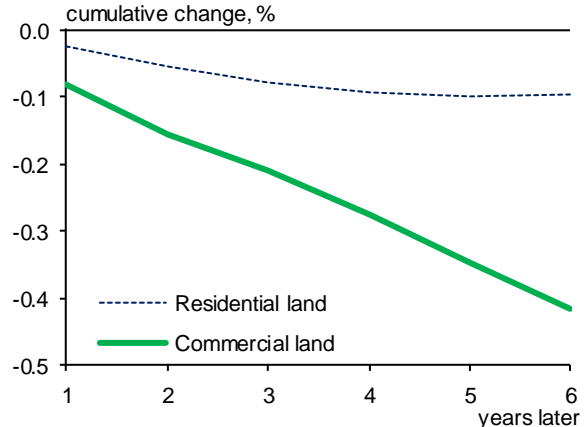
**Chart B1-4: Developments in migrants in 23 Tokyo wards**



Note: The chart shows Japanese net migrants from other parts of Japan.

Source: Ministry of Internal Affairs and Communications, "Report on Internal Migration in Japan."

**Chart B1-5: Effects of a 1 percentage point decline in the changes in population on land values**



Note: The estimation period is from 2001 to 2021. The chart shows the response of land values to a 1 percentage point decline in the changes in population. Estimated using local projection.

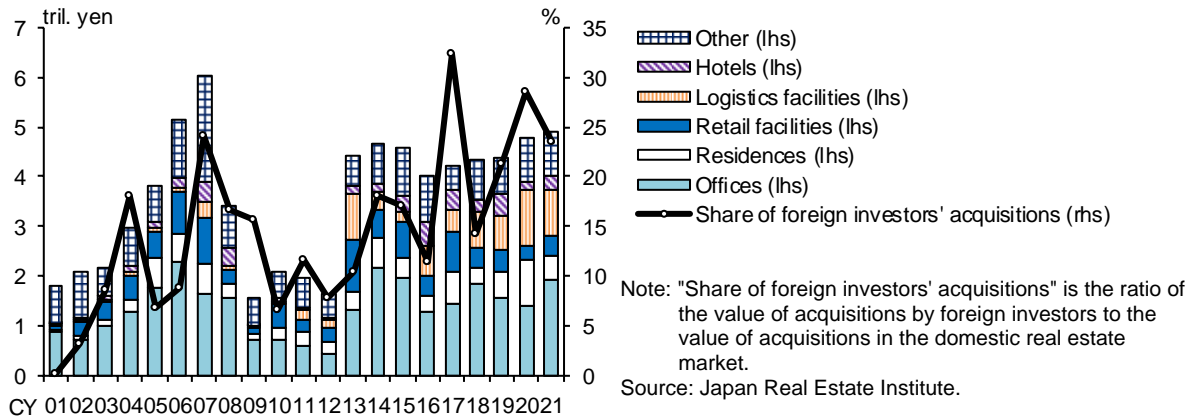
Source: Ministry of Internal Affairs and Communications; Ministry of Land, Infrastructure, Transport and Tourism.

It is widely known from studies such as those on Japan's bubble period that changes in real estate prices affect not only the real estate industry, in particular real estate transaction businesses, but also firms in other industries through, for instance, changes in the value of collateral and, as a result, can affect the balance sheets of financial institutions. The possibility that structural changes in the domestic economy and regional demographics caused by the pandemic may affect real estate prices continues to warrant attention.

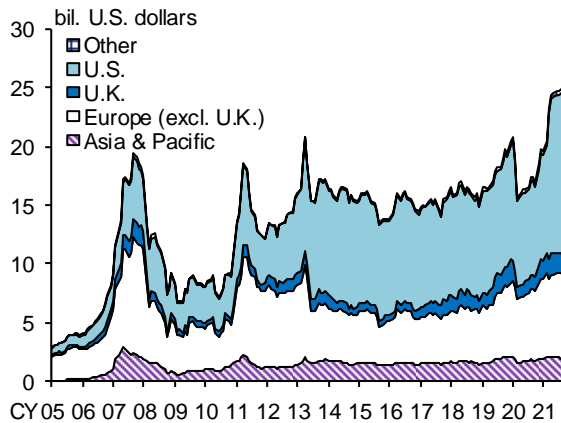
### Box 2: Risk of outflows of overseas funds in the real estate market

In Japan's commercial real estate market, the share of acquisitions by foreign investors has been on an increasing trend and has hovered at around 20 percent in the past few years (Chart B2-1).<sup>87</sup>

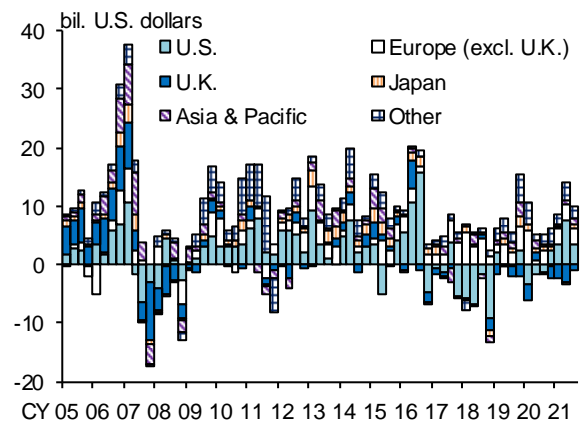
**Chart B2-1: Share of foreign investors' acquisitions in the commercial real estate market**



**Chart B2-2: Japanese real estate fund holdings of foreign investment funds**



**Chart B2-3: Net investment flows from investment funds to real estate funds**



Moreover, domestic real estate funds such as J-REITs, which account for a large share in the commercial real estate market, have also seen inflows of funds from foreign investment funds, mainly from the United States and Europe, into their equity portions, and thus foreign investment funds now hold a share equivalent to almost 20 percent of the total market value of J-REITs (Chart B2-2).

<sup>87</sup> Real estate funds worldwide are worth about 3.6 trillion U.S. dollars (market capitalization of listed funds + net assets of unlisted funds). Of this, listed funds are worth approximately 2.5 trillion dollars, and the U.S. equity REIT market, which accounts for the largest share among these funds, has grown about four times in size compared to before the GFC. This growth appears to be driven by investment by investment funds in real estate funds.



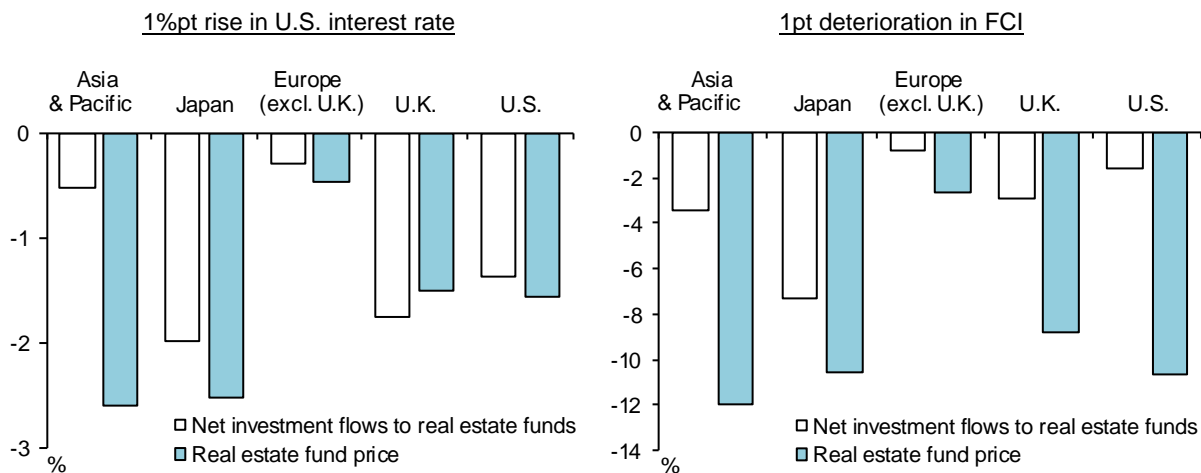
Foreign investors, including such investment funds, tend to construct their portfolios on a global basis and make investment decisions taking into account not only financial and economic conditions of Japan but also other countries such as the United States. Therefore, changes in global financial and economic conditions may affect Japan's real estate market through changes in investment flows from abroad.<sup>88</sup> This box uses the granular data on domestic and foreign investment funds to see the investment flows to real estate funds and examines the effects of global shocks, including those on real estate prices, through changes in capital flows.

Looking at trends of investment funds' positions to real estate funds in various regions, including Japan, it can be seen that such flows follow common global trends to some extent, as seen, for example, in the inflows before the GFC and the outflows afterward (Chart B2-3).

Next, based on estimates using the time-series model, investment flows into real estate funds in various regions including Japan fall after global shocks such as a rise in U.S. interest rates and a widespread deterioration in financial conditions, i.e., a worsening of the FCI, and as a result prices of real estate funds in each region also decline, although there are differences across regions (Chart B2-4). In addition, looking at the sources of funds supplying investment flows into Japanese real estate funds, funds from Europe are the most responsive to these global shocks (Chart B2-5).

In addition to the impact on the direct holdings of financial institutions, such a decline in the prices of real estate funds poses a risk of affecting credit risks, for example by impairing collateral values, through spillover effects on commercial real estate prices. When examining developments in Japan's real estate market, therefore, it is necessary to continue to closely monitor the impact not only of domestic factors but also of changes in global financial and economic conditions.

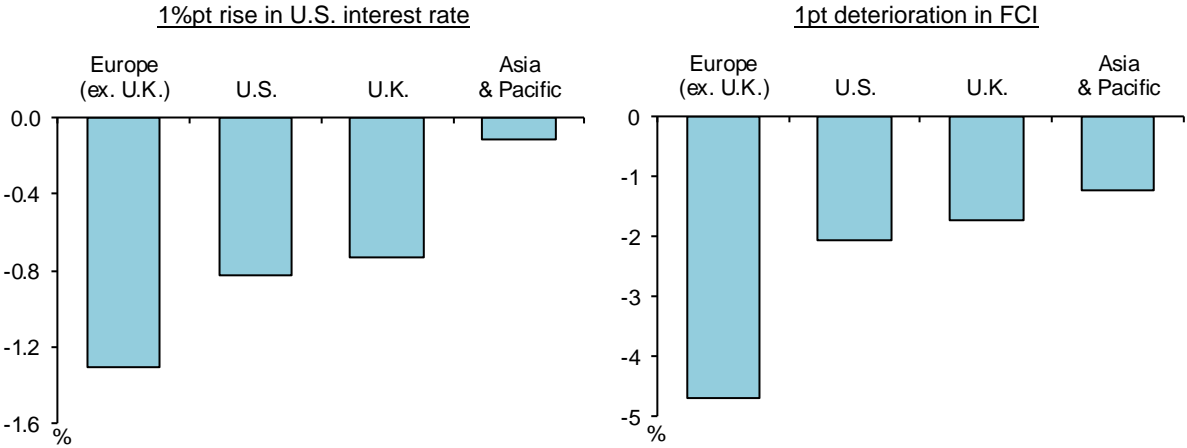
**Chart B2-4: Sensitivity of net investment flows to real estate funds and their prices to global shocks**



Note: 1. Real estate fund prices are calculated from the relationship between AUM and net investment flows.  
 2. The U.S. interest rate is the 10-year U.S. Treasury yield. 10-year government bond yields are additionally used for estimation of Japan, Europe and the U.K. (interest rate variables are 5-year differences in order to remove trends). The FCI is the Chicago Fed National Financial Conditions Risk Subindex calculated by the Federal Reserve Bank of Chicago, which is constructed from variables, such as the volatility index (VIX) and credit spreads of corporate bonds, to capture the impact of a broad deterioration in financial conditions, such as rising credit spreads. The estimation period is from the January-March quarter of 2003 through the January-March quarter of 2021. Instrumental variables estimation (GMM) is used.  
 Source: Federal Reserve Bank of Chicago; OECD; Refinitiv Lipper.

<sup>88</sup> Box 3 of the April 2021 issue of the *Report* showed that the amount of commercial real estate acquisitions in Japan by foreign investors is affected not only by financial conditions in Japan but also by overseas factors such as the global economy, U.S. interest rates, and uncertainty in the United States.

**Chart B2-5: Sensitivity of net investment flows to Japanese real estate funds**



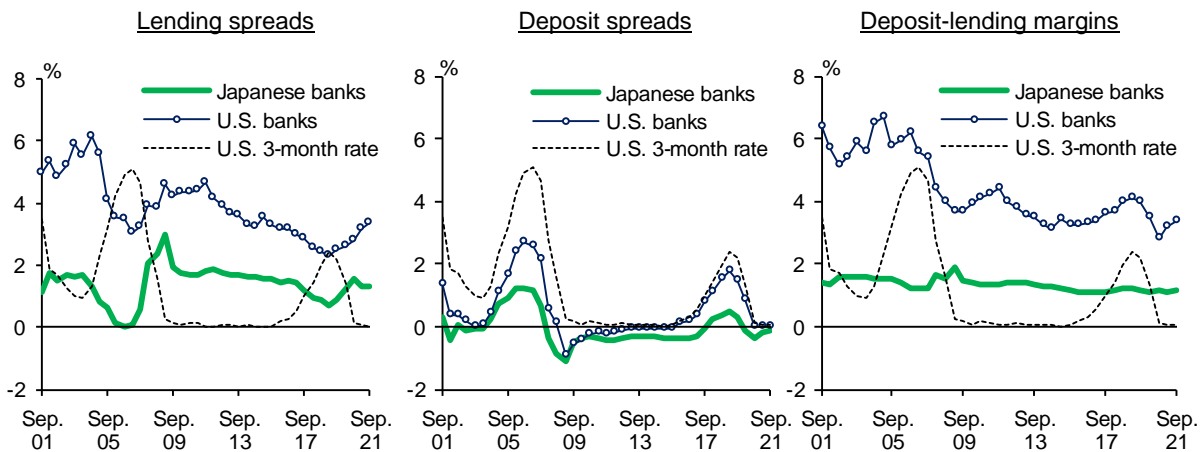
Note: Parameters are obtained by regressing net investment fund flows to Japan (normalized by AUM for Japan at the end of the previous period) on each shock. The estimation period is from the January-March quarter of 2003 through the January-March quarter of 2021. Instrumental variables estimation (GMM) is used.  
 Source: Federal Reserve Bank of Chicago; OECD; Refinitiv Lipper.

### Box 3: U.S. interest rate increases and Japanese banks' deposit-lending margins in overseas lending

This box examines developments in the deposit-lending margins in the international business of Japan's three major banks and the sensitivity of those margins to interest rates during phases when U.S. interest rates rose in recent years, and compares them with U.S. banks, focusing especially on deposit spreads.

In general, deposit and lending rates adjust over time in response to changes in market interest rates. Therefore, during periods when interest rates are rising, lending spreads (= loan interest rates - market interest rate) tend to narrow and deposit spreads (= market interest rate - deposit interest rates) tend to widen, and in most cases, deposit-lending margins (lending spreads + deposit spreads) tend to improve. This tendency can be clearly observed for U.S. banks (Chart B3-1).

Chart B3-1: Interest rate spreads in corporate lending market



Note: 1. "Japanese banks" refers to the international business of Japan's three major banks, while "U.S. banks" refers to the national associations of the Bank of America, Citigroup, JPMorgan Chase, and Wells Fargo. The same applies to Chart B3-2.

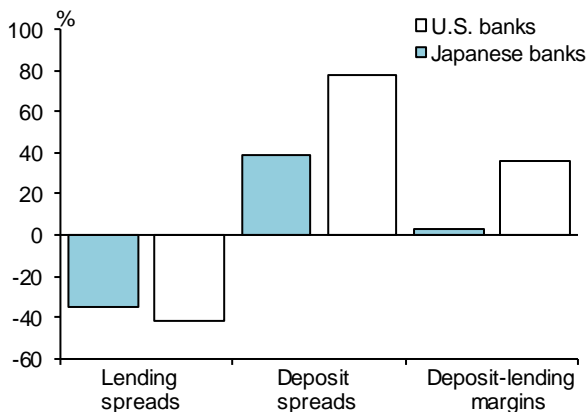
2. Lending data cover commercial and industrial loans. Data for deposits include CDs. The same applies to Chart B3-2.

3. B/S items are linearly interpolated and P/L items are interpolated using the growth rates of other banks when data for individual banks were not available. The same applies to Chart B3-2.

Source: FFIEC; FRED; BOJ.

However, compared with U.S. banks, improvements in the deposit-lending margins of Japanese banks when U.S. interest rates rise appear to be limited. To see this, the extent of increases in loan and deposit interest rates in response to rising U.S. interest rates is examined by calculating the pass-through of changes in market rates, defined as the ratio of changes in lending or deposit rates with respect to the increase in short-term U.S. interest rates during the last phase of interest rate hikes. For U.S. banks, the pass-through rate for deposit interest rates is considerably smaller than that for lending rates, resulting in a relatively large increase in deposit-lending margins. On the other hand, in the case of Japanese banks, while the pass-through rate for lending rates is about the same as that of U.S. banks, the pass-through rate for deposit rates is quite similar to that for lending rates, so that the increase in deposit-lending margins is limited (Chart B3-2).

**Chart B3-2: Pass-through rates during phases of interest rate hikes in the U.S.**

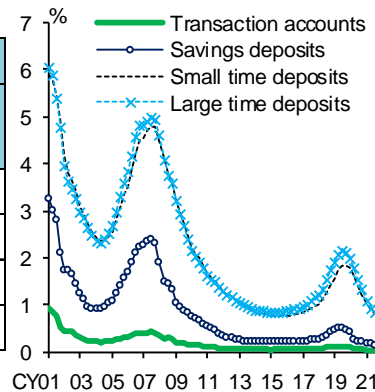


Note: Pass-through rates are the averages of the latest phase of U.S. interest rate hikes (first half of fiscal 2015 to second half of fiscal 2018) and defined as the change in each rate or margin / change in the U.S. 3-month rate.  
Source: FFIEC; FRED; BOJ.

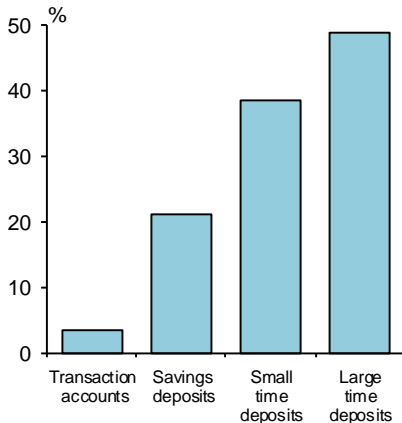
**Chart B3-3: Types and shares of U.S. deposits**

	Share (Jan.-Mar. 2021, %)		
	Japanese banks' U.S. branches	European banks' U.S. branches	U.S. banks
Transaction accounts	17.7	33.0	29.3
Savings deposits	25.0	8.4	62.1
Small time deposits			3.8
Large time deposits	57.2	58.6	4.8

**Chart B3-4: Interest rates by deposit type**



**Chart B3-5: Pass-through rates by deposit type**



Note: 1. Chart B3-4 shows the median values of U.S. banks.  
2. Pass-through rates in Chart B3-5 are the averages of the two recent U.S. interest hike phases (second half of fiscal 2003 to second half of fiscal 2006 and first half of fiscal 2015 to second half of fiscal 2018) and defined as changes in deposit rates / changes in the U.S. 3-month rate.  
Source: FDIC; Federal Reserve Bank of Chicago; FFIEC; FRED.

Next, the reasons for the high pass-through rate for deposit interest rates for Japanese banks is examined.<sup>89</sup> Deposits can be divided into transaction account deposits and other deposits, and other deposits can be further divided into savings deposits, small time deposits, and large time deposits. Foreign banks' branches in the United States tend to have fewer transaction account deposits and a greater amount of large time deposits than U.S. banks, partly because their customer bases are relatively weak and they are subject to separate regulations (Chart B3-3).<sup>90</sup> Looking at deposit interest rates for each of these deposit types shows that the pass-through rate of market interest rate changes is highest for time deposits, followed by savings deposits, and then transaction account deposits (Charts B3-4 and B3-5). The fact that savings deposits to a large extent consist of retail deposits and that the reason for holding transaction account deposits is typically not asset management may explain why interest rates on these types of deposits are not sensitive to market

<sup>89</sup> The fact that the dollar deposit interest rates of Japanese banks increase more than those of their U.S. counterparts in response to a rise in U.S. short-term interest rates is also highlighted in Box 4 of the April 2019 issue of the *Report*.

<sup>90</sup> Under the Federal Deposit Insurance Corporation Improvement Act (FDICIA) enacted in 1991, foreign banks in the United States are prohibited in principle from obtaining small deposits (retail deposits).

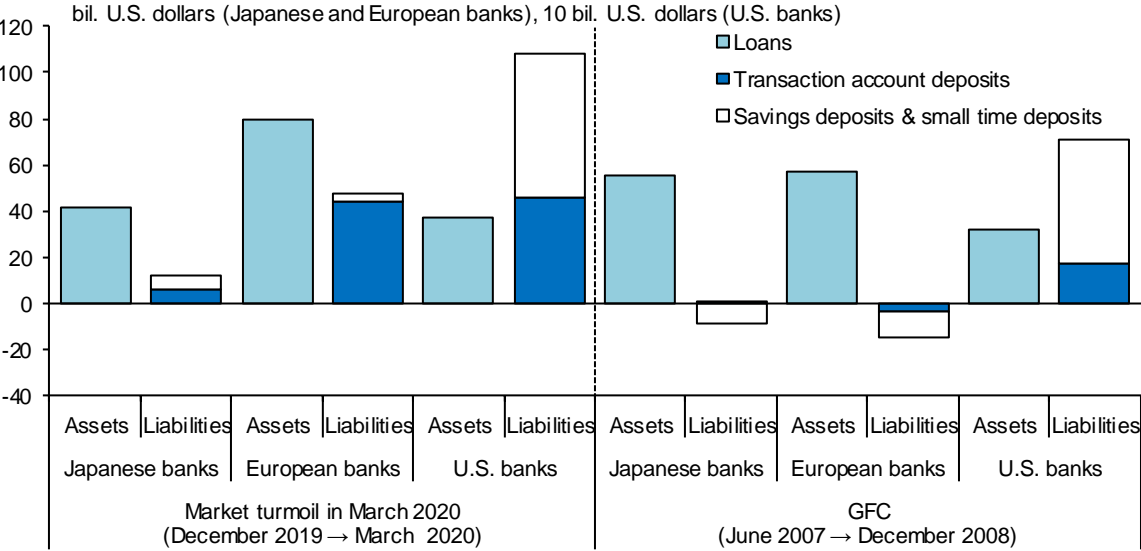
rates. Therefore, one potential reason behind the high pass-through rate of market interest rate changes to deposit rates at Japanese banks may be the composition of their deposits.

These results suggest that improvements in deposit-lending margins in Japanese banks' overseas lending are likely to be limited even when U.S. interest rates rise. However, as noted in the previous *Report*, Japanese banks have been expanding their transaction account deposits in an effort to build stable foreign currency funding bases. The results of the analysis also suggest that such efforts may produce desirable results in terms of their deposit-lending margins.

**Box 4: Foreign currency funding during a deterioration in financial conditions**

As seen in the previous *Report*, when financial markets were hit by an adverse shock, such as the GFC or the market turmoil in March 2020, the loan-to-deposit gap of Foreign Banking Offices (FBOs) in the United States, tended to widen as their lending increased due to, for example, the drawdown of committed lines while the growth of deposits was either limited or negative (Charts B4-1 and B4-2).<sup>91</sup> This is likely because the short-term demand for funds, including precautionary borrowing by firms, increases in times of crisis, and as a result of the deterioration in financial conditions, it becomes more difficult for firms to raise funds through other means, such as corporate bonds. In particular, during the GFC, Japanese banks in the United States tended to rely on FX and currency swaps because, in addition to the widening of loan-to-deposit gaps, they faced difficulty in funding through CDs and CP.

**Chart B4-1: Changes in loan-to-deposit gap**



Note: "Japanese banks" and "European banks" refer to the U.S. branches of Japanese and European banks. The same applies to subsequent charts.  
 Source: FDIC; Federal Reserve Bank of Chicago.

Reflecting this experience, a new liquidity risk indicator taking into account the possibility of a drawdown of unused committed lines has been proposed recently (Acharya et al., 2021).<sup>92</sup> The liquidity risk indicator is defined as follows:

$$\text{Liquidity risk indicator} = (\text{Committed lines} + \text{Wholesale funding} - \text{Liquid assets}) / \text{Total assets}$$

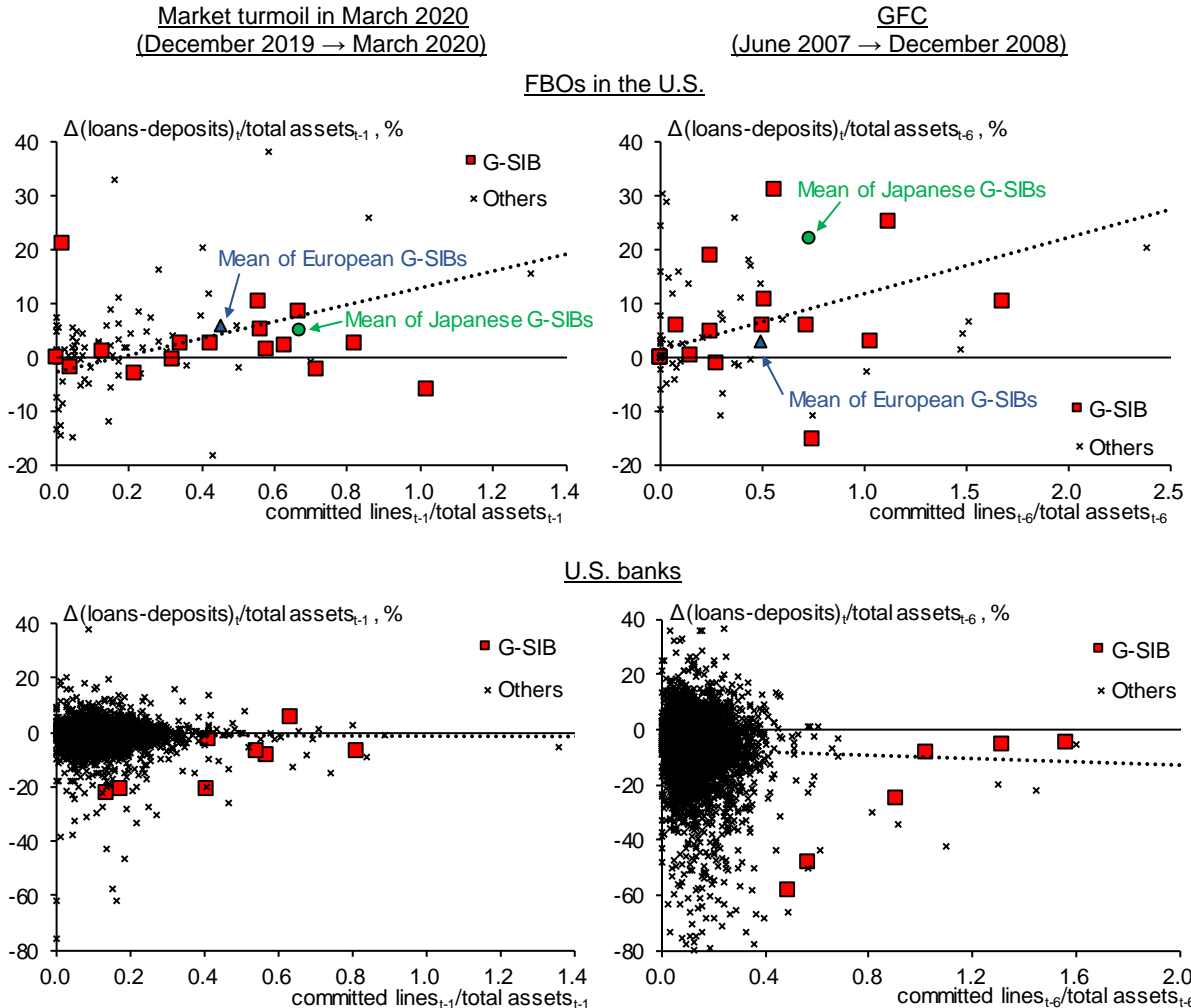
A comparison of Japanese and European banks in the United States shows that the level of this liquidity risk indicator has been relatively high for Japanese banks in recent years (left and middle

<sup>91</sup> U.S. branches and agencies of foreign banks here do not include U.S. subsidiaries, and deposits exclude large time deposits, a considerable proportion of which consist of certificates of deposit (CDs).

<sup>92</sup> For details on the liquidity risk indicator, see Acharya, V. V., Engle III, R. F., and Steffen, S., "Why Did Bank Stocks Crash During COVID-19?," NBER Working Paper Series, no. 28559, March 2021. Wholesale funding in the liquidity risk indicator excludes transaction account deposits and small time deposits and represents the sum of large time deposits, repo funding, and other borrowing. The liquidity risk indicators in this *Report* are calculated using the data for branches in the United States.

panels of Chart B4-3). The following describes drivers of the indicator and the implications for foreign currency funding risk.

**Chart B4-2: Relationship between loan-to-deposit gap and committed lines**



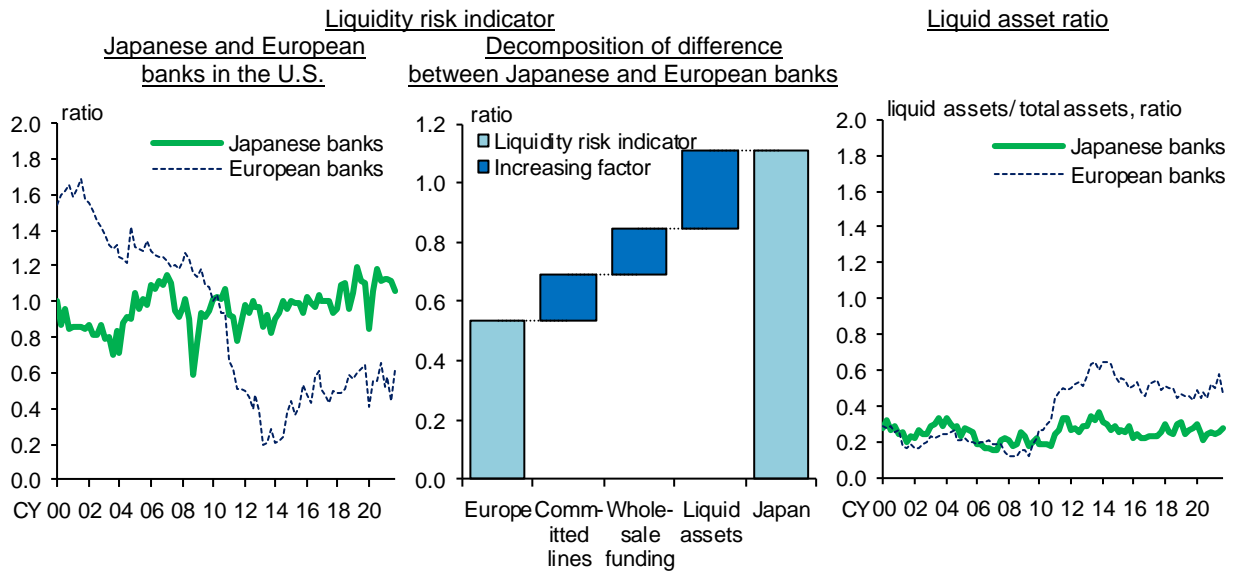
Note: The vertical axes show changes in the loan-to-deposit gap, while the horizontal axes show the ratio of committed lines to total assets at the beginning of the period. The figures for FBOs in the U.S. represent the total for the branches of each financial institution. Deposits exclude large time deposits. Committed lines represent unused commitments. G-SIBs are as at November 2021.

Source: FDIC; Federal Reserve Bank of Chicago.

Starting with the asset side, even when precautionary borrowing by firms increases in the event of a broad-based deterioration in financial conditions, stress in terms of funding can be mitigated if financial institutions have sufficient amounts of liquid assets (Chart B4-4). Regarding this point, while Japanese banks have been expanding their foreign currency balance sheets, they have also been increasing their holdings of liquid assets, which in turn has led to generally stable developments of the liquid asset ratios on their balance sheets (right panel of Chart B4-3).<sup>93</sup> That said, during the market turmoil in March 2020, besides liquid assets that financial institutions had accumulated prior to the turmoil, central banks' massive supply of dollar funds greatly helped financial institutions to secure liquid assets.

<sup>93</sup> Liquid assets are the sum of cash and deposits, U.S. government securities, and repos held by branches in the United States.

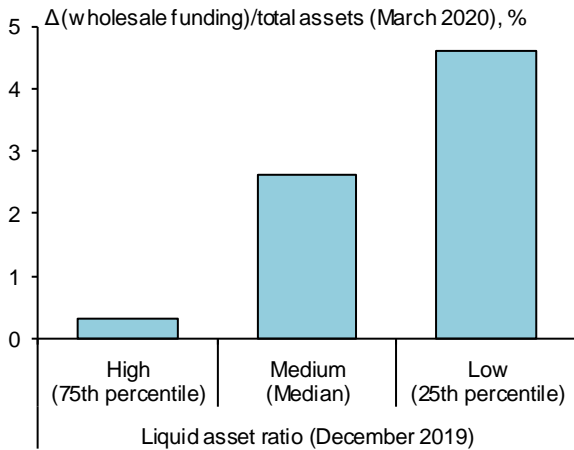
**Chart B4-3: Liquidity risk indicator and liquid assets**



Note: 1. Liquidity risk indicator = (Committed lines + Wholesale funding – Liquid assets)/ Total assets (Acharya et al. 2021).  
 2. The liquidity risk indicator is calculated for FBOs in the U.S. Wholesale funding consists of large time deposits, and other borrowings of the U.S. branches. Liquid assets consist of cash and deposits, U.S. government securities, and reverse repos of the U.S. branches.  
 3. The latest data in the left- and right-hand charts are as of the end of December 2021.  
 4. "Committed lines," "Wholesale funding," and "Liquid assets" in the middle chart represent the contribution of differences between Japanese and European banks in the U.S. in terms of the percentage of total assets. Data are the averages for 2021.

Source: Federal Reserve Bank of Chicago; FFIEC.

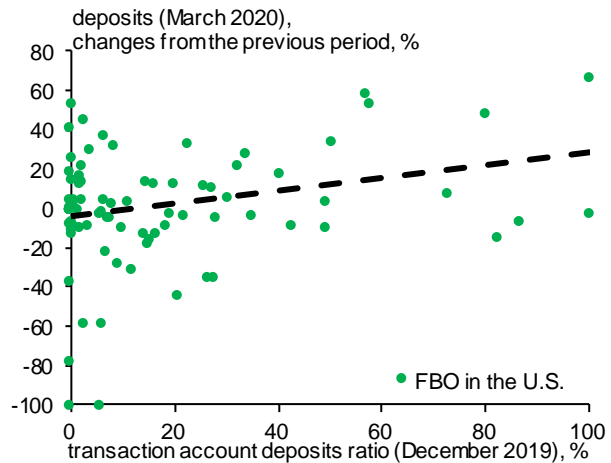
**Chart B4-4: Liquid assets and wholesale funding**



Note: 1. This figure shows how the responses of FBOs' wholesale funding during the market turmoil in March 2020 differed depending on their liquid asset ratios. Figures are calculated using the parameter estimates obtained by regressing changes in wholesale funding (normalized by total assets at the end of the previous period) on the liquid asset ratio and the committed line ratio (both at the end of the previous period). All parameters are statistically significant. Figures are the sum of effects of the committed line ratio (median) and the liquid asset ratio (high/medium/low). Estimated as of end-March 2020. Observations consist of 150 branches of FBOs in the U.S.  
 2. High/medium/low correspond to the 75th percentile value (57.5%), 50th percentile value (29.9%), and 25th percentile value (5.7%) of FBOs' liquid asset ratio.

Source: Federal Reserve Bank of Chicago.

**Chart B4-5: Transaction account deposits and changes in deposits**



Note: The figures for "FBO in the U.S." represent the total for branches of each financial institution. Deposits exclude large time deposits. The slope of the regression line is statistically significant at the 5% level.

Source: Federal Reserve Bank of Chicago.



Next, looking at the liability side, the share of transaction account deposits in Japanese banks' overall deposits has been increasing in recent years.<sup>94</sup> At the time of the March 2020 market turmoil, foreign banks in the United States that had a higher transaction account deposits ratio before the crisis tended to see higher growth in their deposits (Chart B4-5). This suggests that Japanese banks' efforts to increase the share of transaction account deposits in their overall deposits may reduce their reliance on wholesale funding and help them secure more stable funding bases.

However, the liquidity risk indicator for Japanese banks is higher than that for European banks in the United States. This reflects the fact that European banks in the United States hold a large amount of liquid assets, have a relatively high transaction account deposits ratio, and are less reliant on wholesale funding than Japanese banks (Chart B3-3). It has been noted that large U.S. corporations in recent years have become increasingly selective about banks they transact with in terms of how much investment is made in digital platforms, in consideration of streamlining business processes such as those with regard to payment.<sup>95</sup> Under such circumstances, some European banks have been acquiring customers and transaction account deposits through the development of integrated digital platforms for corporations that cover payment, investment, trade finance, foreign exchange, and other services.<sup>96</sup> During the market turmoil in March 2020, at some branches of European banks, a fair amount of the credit they had extended remained within the banks as transaction account deposits (Charts B4-1 and B4-2). A possible reason lies in efforts made before the crisis to improve the convenience of payment services possibly having contributed to containing the outflow of deposits during the crisis.

While Japanese banks have been increasing their transaction account deposit ratios in recent years, further efforts to improve the convenience of payment services may also be beneficial in terms of the stability of foreign currency funding.

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<sup>94</sup> See Box 3 of the previous *Report*. The figures for transaction account deposits are constructed based on the definition of the Federal Financial Institutions Examination Council (FFIEC) and consist of deposits in deposit accounts that can be used without restrictions for transfers and withdrawals, primarily for payment purposes, and conceptually form a part of financial institutions' liquid deposits.

<sup>95</sup> For more on U.S. corporations' growing demand for digital payment services in recent years, see Coalition Greenwich, "Across U.S. Large Corporate Banking, the Digital Race is On," January 2022.

<sup>96</sup> For more on European banks' efforts, see Euromoney: <https://www.euromoney.com/article/b1fk0m5n9ffnw9/awards-for-excellence-2019-western-europe-results>.

**Box 5: Impact of the situation in Ukraine on Japan's financial system**

This box summarizes the impact of the situation in Ukraine on Japan's financial system, based on the information currently available.

*Claims to Russia and Ukraine by financial institutions*

Japanese financial institutions' outstanding amount of claims to Russia is 7.1 billion U.S. dollars, representing only 0.3 percent of their total cross-border claims and 2 percent of their claims to emerging markets (Chart B5-1).

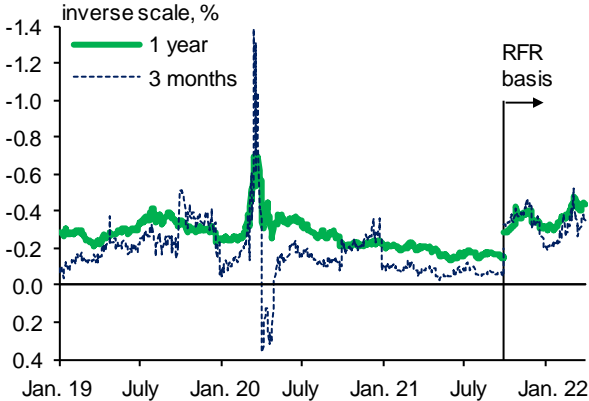
Looking at loans extended to overseas large borrowers, a considerable portion of the loans is to the country's major natural resources and energy firms, the majority of which are categorized as "investment grade" in the internal credit rating. However, borrowers' business conditions may deteriorate, affecting the repayment of loans, as a result of economic sanctions, and the downgrading of Russian government bonds may lead to a revision of internal credit ratings. In addition, it should be noted that project finance loans may be substantially affected by a decline in cash flow resulting, because of their long maturity, for example, from economic sanctions or suspension of trading with clients. Meanwhile, the outstanding amount of loans to Ukraine is minimal, at around 100 million U.S. dollars.

**Chart B5-1: Cross-border claims to Russia (by country)**  
End of September 2021

	Country	Outstanding (mil. USD)	Share (%)
1	France	23,644	0.7
2	Italy	23,195	2.3
3	Austria	17,086	3.6
4	United States	14,497	0.3
5	Japan	7,134	0.3
6	Germany	5,153	0.3
7	United Kingdom	3,073	0.1
8	Korea	1,416	0.7
9	Finland	935	0.2
10	Spain	278	0.0

Note: 1. The chart shows each country's outstanding amount of cross-border claims to Russia and the share in each country's total cross-border claims (on an ultimate risk basis).  
2. The figures for Japan exclude trust banks.  
Source: BIS, "Consolidated Banking Statistics"; BOJ, "Results of BIS International Location Banking Statistics and International Consolidated Banking Statistics in Japan."

**Chart B5-2: U.S. dollar funding premiums in cross-currency basis swaps**



Note: From October 1, 2021, there is a discontinuity in the data due to the switch from LIBOR to a risk-free rate (RFR) basis. The latest data are as at March 31, 2022.  
Source: Bloomberg.

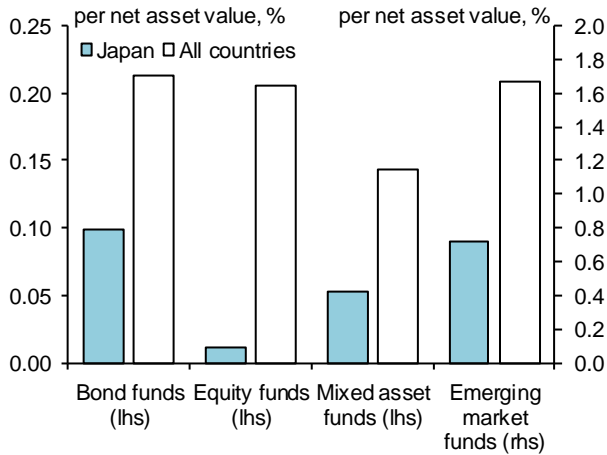
*Impact on foreign currency funding*

Although the dollar funding premium in FX and currency swaps has widened slightly, Japanese financial institutions have not seen difficulties in their foreign currency funding, such as U.S. dollar funding (Chart B5-2). Moreover, at present, they have not seen difficulties in the rouble-denominated funding of their local subsidiaries in Russia.

### Securities investment

Japanese financial institutions' holdings of Russia-related bonds and equities are limited. Moreover, the share of Russian assets in investment funds' holdings is extremely small: even among the emerging market funds, the share is no more than 1.7 percent (Chart B5-3). The overall impact of falling prices of investment trusts and funds on institutional investors and households therefore is likely to be small.

**Chart B5-3: Russian asset holdings by investment funds**



Note: The figures for "Japan" cover about 4 thousand investment funds, while those for "All countries" cover about 180 thousand investment funds. "Emerging market funds" consists of bond funds and equity funds that invest in emerging economies. Data as at end-February 2022.  
Source: Refinitiv Lipper.

### Cyber risk

Attention also needs to be paid to the potential impact on the operations of Japanese financial institutions, such as an increase in cyberattacks against Japan, which could affect Japan's financial system.

### Spillovers to Japan's financial system

In sum, the impact of the situation in Ukraine on Japan's financial system at present appears to be limited. Nevertheless, there is substantial uncertainty going forward, and attention should be paid to the potential negative impact of sanctions, rising resource and energy prices, and disruptions to supply chains on borrower firms' profits. Moreover, should there be a major deterioration in overseas economies, a rise in U.S. and European interest rates due to higher raw material prices and inflation expectations, and a substantial and rapid adjustment in global financial markets, the spillover effects on Japan's financial system could be significant.

For Japanese financial institutions, it continues to be important to conduct their business operations, carefully managing risks related to claims to Russia and Ukraine, monitoring market developments, and paying close attention to the possible impacts through a range of different channels.