



**BOJ**  
*Reports & Research Papers*

# Financial System FSR report



BANK OF JAPAN  
OCTOBER 2024

The total of major banks, regional banks, and *shinkin* banks covered in this *Report* is as follows (as of end-September 2024).

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, SBI 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 of end-September 2024.

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Financial System Research Division,  
Financial System and Bank Examination Department, Bank of Japan  
[post.bsd1@boj.or.jp](mailto:post.bsd1@boj.or.jp)

## Objectives of the *Financial System Report*

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

The *Report* assesses the vulnerabilities of the financial system from a macroprudential perspective. Within a macroprudential framework, institutional designs and policy measures are developed based on risk assessments in the financial system in order to ensure the stability of the overall financial system. In so doing, the interconnectedness of the real economy, financial and capital markets, and financial institutions' behavior are taken into account.

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. It 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 October 2024 issue

Since summer 2024, domestic and foreign financial markets have shown unstable developments, and there remain concerns over the possibility that geopolitical risks could generate large fluctuations in the real economy and financial markets. In Japan, some real estate indicators warrant attention with real estate-related loans continuing to increase.

While Japan's economy has recovered moderately, defaults have been increasing especially among firms whose profits have been improving only at a slow pace. This *Report* attempts to analyze the reasons behind the recent rise in default rates by focusing on vulnerabilities present since before the pandemic and the impact of rising raw material and labor costs.

After changing its monetary policy framework in March 2024, the Bank raised the policy interest rate in July. Against this background, banks have been setting loan and deposit interest rates, taking into account changes in market interest rates. This *Report* provides updates on the impact of changes in the interest rate environment on banks, households, and firms, based on certain assumptions.

On this basis, the *Report* assesses the resilience of and potential vulnerabilities in Japan's financial system.

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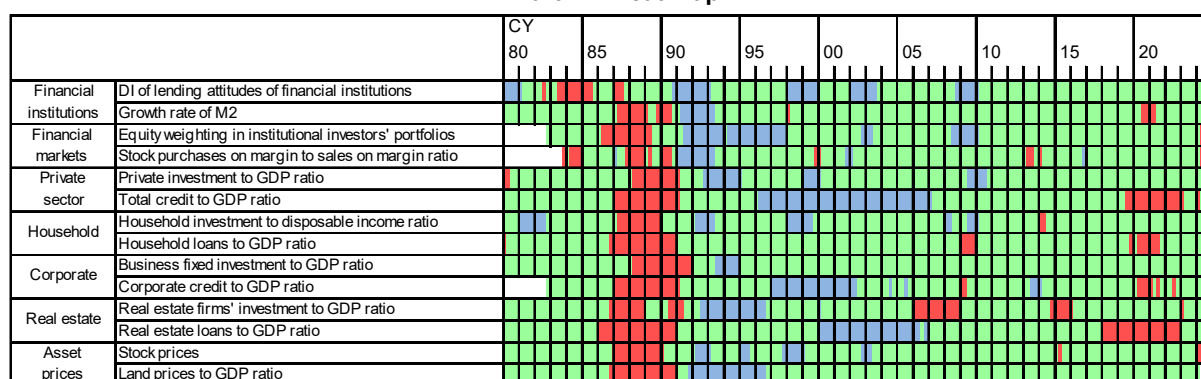
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## I. Executive summary: Stability assessment of Japan's financial system

Japan's financial system has been maintaining stability on the whole.

Financial intermediation has continued to function smoothly. In the loan market, despite the increase in lending rates, firms' demand for loans has risen. Banks' lending stance has also remained active. No major financial imbalances can be observed in these financial intermediation activities (Chart I-1).

Chart I-1: Heat map



Note: See Chart III-3-1.

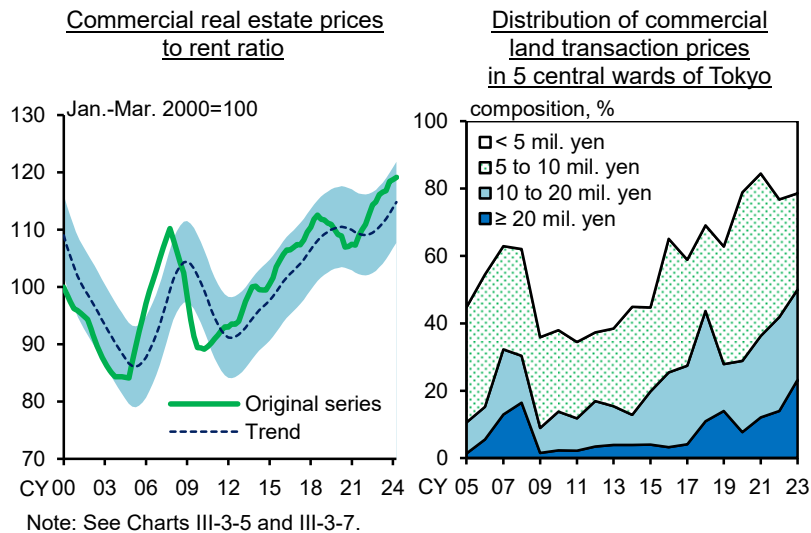
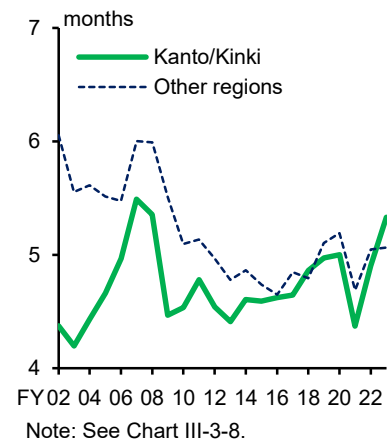
Japanese banks have sufficient capital bases and stable funding bases to withstand stress similar to the global financial crisis that causes a major correction in financial markets and the real economy at home and abroad and stress in which rises in interest rates and a slowdown in the real economy on a global basis occur at the same time. However, vigilance against tail risks, including developments in global financial markets and geopolitical risks, continues to be warranted. From a long-term perspective, if the structural decline in firms' loan demand reflecting the shrinking population and other factors continues, depending on the supply and demand balance in the loan market, banks' profitability and loss-absorbing capacity could decline, and this could lead to a contraction of financial intermediation activities or an overheating, such as excessive search for yield. With these in mind, this *Report* examines risks regarding Japan's financial system and its vulnerabilities.

### Developments in asset prices → Chapters II, III-C, IV-B, and Box 1

In the stock market, *stock prices*, *stock purchases on margin to sales on margin ratio*, and *equity weighting in institutional investors' portfolios* in the heat map are "red," which signals an upward deviation from the trend (Chart I-1). There were fluctuations in asset prices globally at the beginning of August, mainly due to the effects of an unwinding of investors' positions triggered by concerns over the economic slowdown in the United States. However, price-earnings (P/E) ratios have remained at their historical average and in terms of stock valuations there is no significant overheating. That said, considering that Japanese banks have a certain amount of market risk associated with stockholdings, developments in asset prices warrant attention.

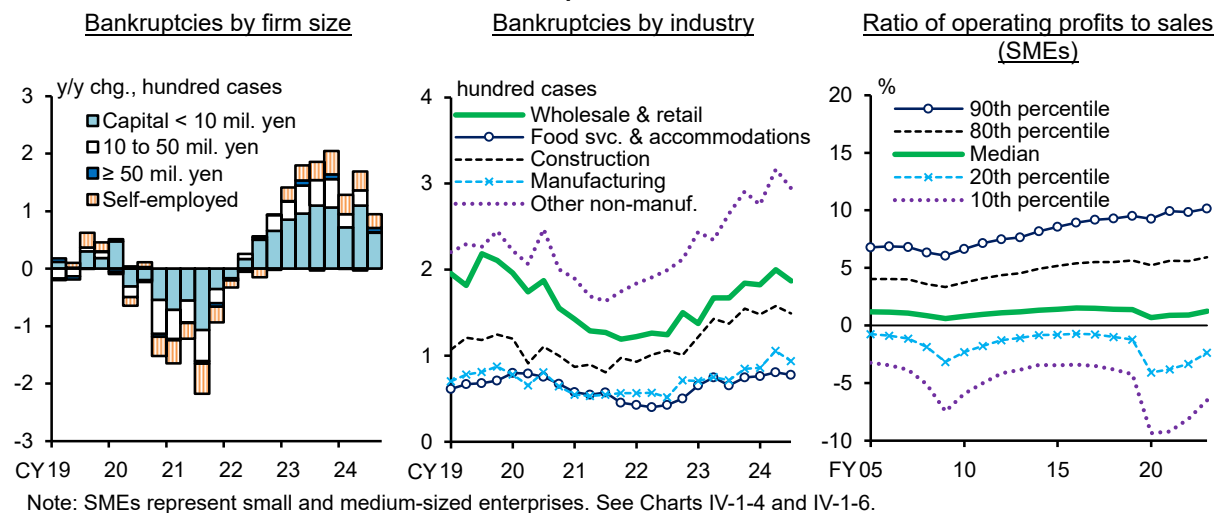
In addition, in Japan's real estate market, valuations of some properties seem relatively high as loans to real estate businesses have remained on an increasing trend. The commercial real estate prices to rent ratio has been above the level seen in the mini-bubble period and transactions in some limited commercial areas in central Tokyo have been at higher price ranges (Chart I-2). Inventories relative to sales have been elevated in some real estate transaction businesses (Chart I-3). Vacancy rates for office buildings in central Tokyo have recently begun to decline, real estate

businesses' financial conditions have continued to improve in tandem with economic recovery, and default rates have been at low levels. However, attention is warranted to the fact that leverage ratios in the real estate sector are higher and businesses in the sector are more sensitive to interest rate changes than those in other sectors. In addition, given that foreign funds have continued to sell investment properties in Japan as part of their portfolio rebalancing, it is necessary to pay even more attention to the outlook for the real estate market.

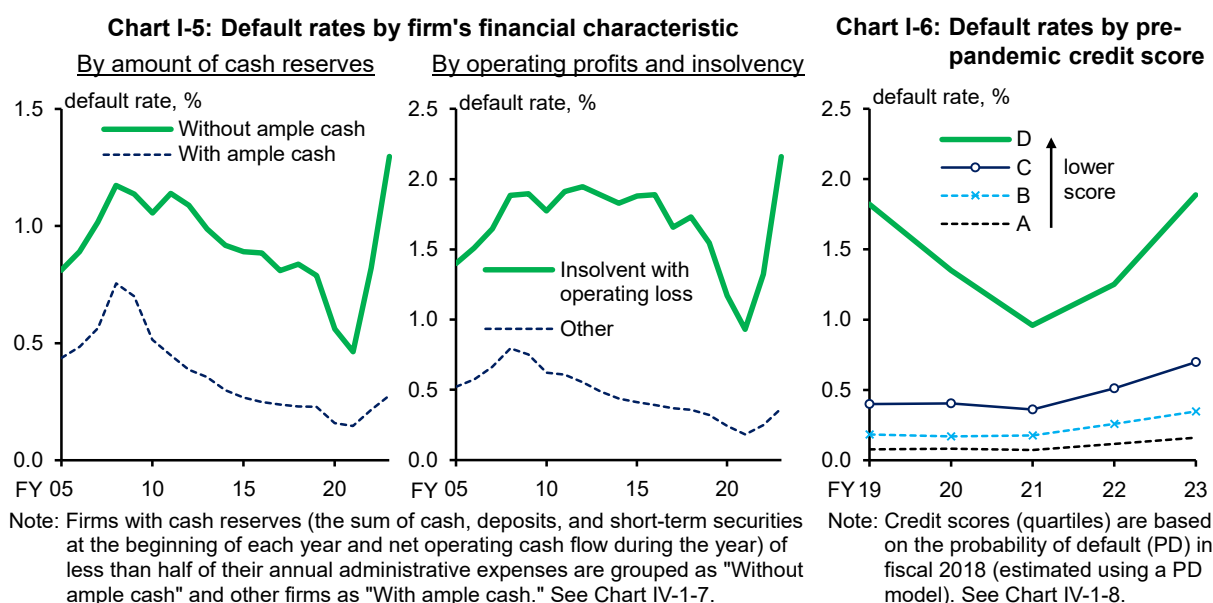
**Chart I-2: Commercial real estate prices****Chart I-3: Inventory turnover periods of real estate transaction businesses**

### *Corporate bankruptcies and defaults amid economic improvement → Chapter IV-A and Boxes 3 and 4*

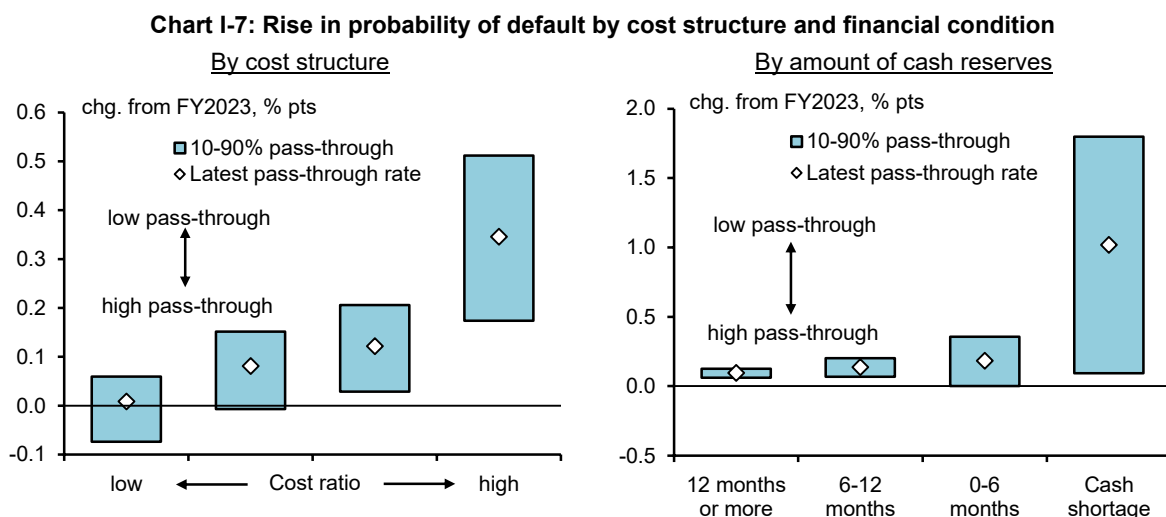
Looking at banks' credit risks, the quality of banks' loan portfolios has been maintained overall as many firms' financial conditions have continued to show improvement amid the continued moderate recovery in Japan's economy. In addition, banks' credit cost ratios have remained low. However, there is considerable heterogeneity in firms' financial conditions, given that some firms' profits have been improving only at a slow pace due in part to the rise in raw material and labor costs, and the number of corporate bankruptcies and the default rate have exceeded the figures marked before the pandemic (Chart I-4).

**Chart I-4: Number of bankruptcies and firms' financial conditions**

Looking in detail at the financial conditions of firms that defaulted, the default rate of firms that are financially vulnerable has been rising most recently -- i.e., firms with relatively little cash reserves and those that are both making operating losses and are insolvent (Chart I-5). After a temporary decline in the default rate of these firms, due in part to the various measures to support corporate financing since the pandemic, the default rate has risen again, suggesting the possibility that past vulnerability has materialized with a time lag. In fact, classifying defaulted firms into different groups by credit scores (with equal weight), based on their financial conditions before the pandemic, suggests that a considerable number of firms that defaulted in fiscal 2023 were already vulnerable before the pandemic (Chart I-6). However, the default rate of firms that were not vulnerable before the pandemic has also been rising slightly, and this might be due to the effects of shocks, including rises in costs that occurred since the pandemic.



Estimating the impact of the recent upward pressure of costs on the probability of default shows that, in the event of a rise in costs, the probability of default increases nonlinearly for firms with larger variable and labor costs relative to their sales and for firms without ample cash reserves. It should be noted, however, that considerable variations in the probability of default could emerge depending on the size of the price pass-through rate (Chart I-7).



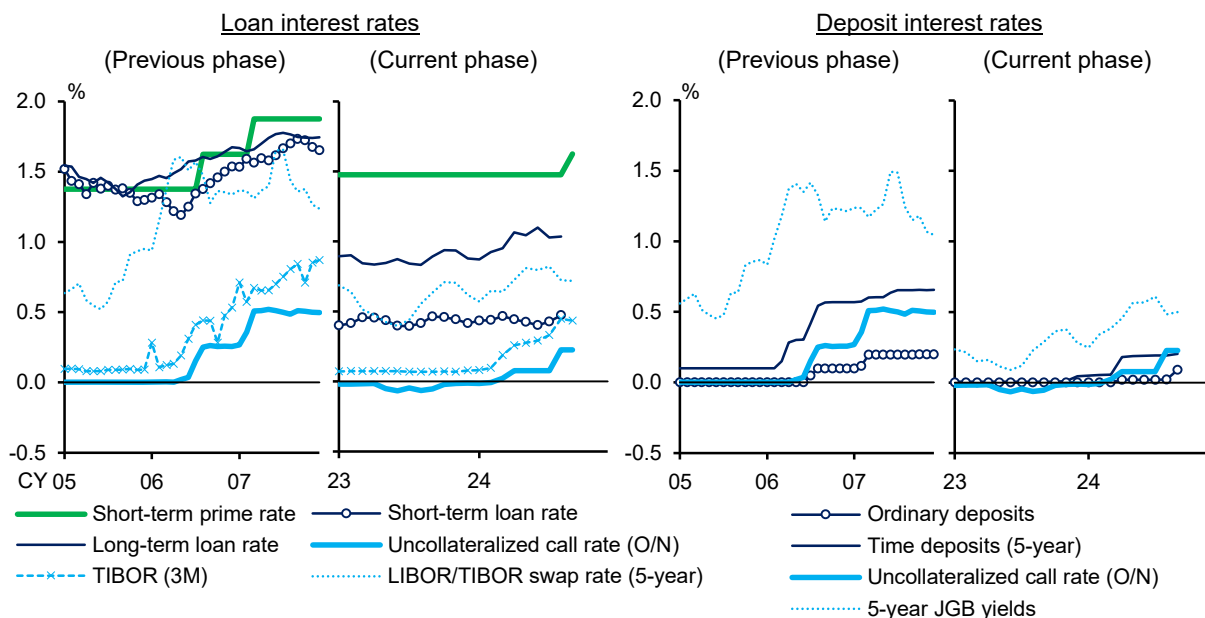


*The effects of a rise in market interest rates on loan and deposit interest rates* → Chapters III-A and IV-D

The Bank of Japan changed its monetary policy framework in March 2024, and raised the policy interest rate in July. The uncollateralized overnight call rate was in the range of 0 to 0.1 percent from March, and rose after the policy rate hike in July, staying at around 0.25 percent. Given that banks take into account changes in market interest rates when setting loan and deposit interest rates, these developments in interest rates will continue to affect various economic entities.

Looking at developments in loan interest rates since the previous *Report*, banks' average contract interest rates on new long-term loans and discounts have been rising moderately, given that a rise in market interest rates in the medium-term zone, which are the main base rates for these loans, preceded the change in policy interest rates (left panel of Chart I-8). Although short-term loan interest rates have been more or less unchanged so far, it is necessary to confirm the effect on loan interest rates of September's rise in short-term prime rates.

**Chart I-8: Loan and deposit interest rates (compared to the previous phase of policy rate hikes)**

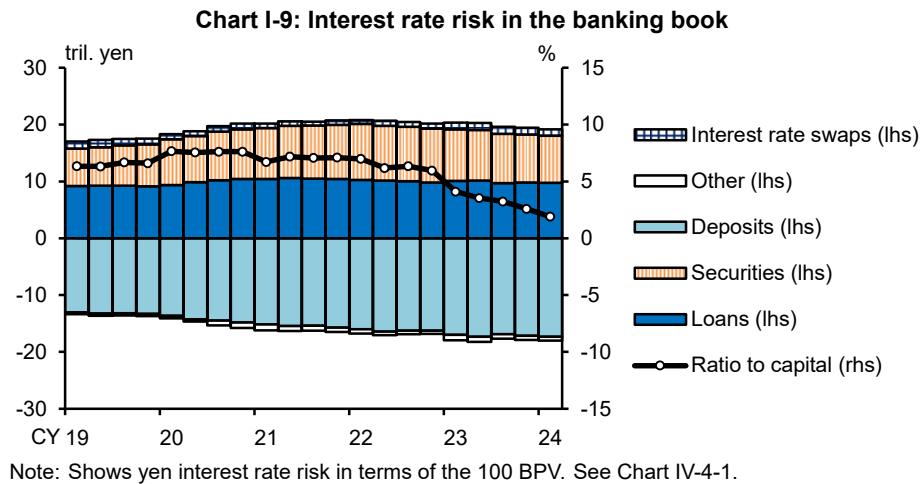


Note: The latest data for market rates, short-term prime rates, and deposit rates are as of September 2024. Those for loan rates are as of August 2024. See Chart IV-4-7.

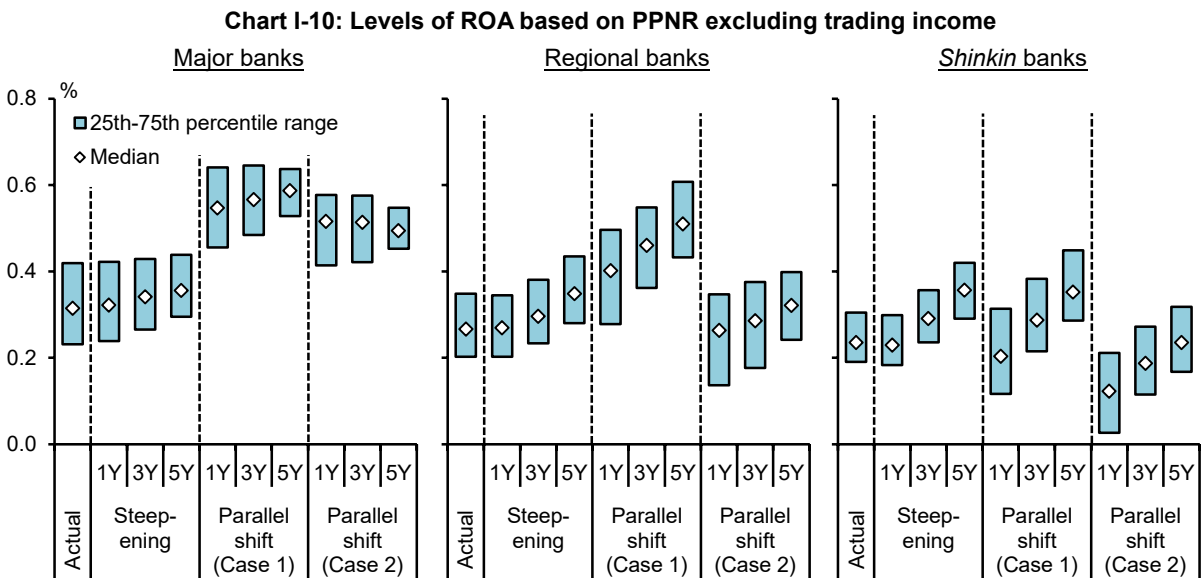
With regard to deposit interest rates, while interest rates on time deposits were raised before ordinary deposits, interest rates on ordinary deposits have risen to around 0.1 percent recently (right panel of Chart I-8). As was the case in the previous phase of policy rate hikes in 2006-2007, the increase in deposit interest rates is somewhat modest compared with the increase in the policy interest rate.

*Banks', firms', and households' resilience to rising interest rates* → Chapters III-C, IV-A, IV-B, IV-D, V-B, and Box 2

Banks have been rebalancing their securities portfolios, and the duration of their yen-denominated bondholdings has been getting shorter. Reflecting this rebalancing, banks' resilience to rising yen interest rates has been increasing (Chart I-9).



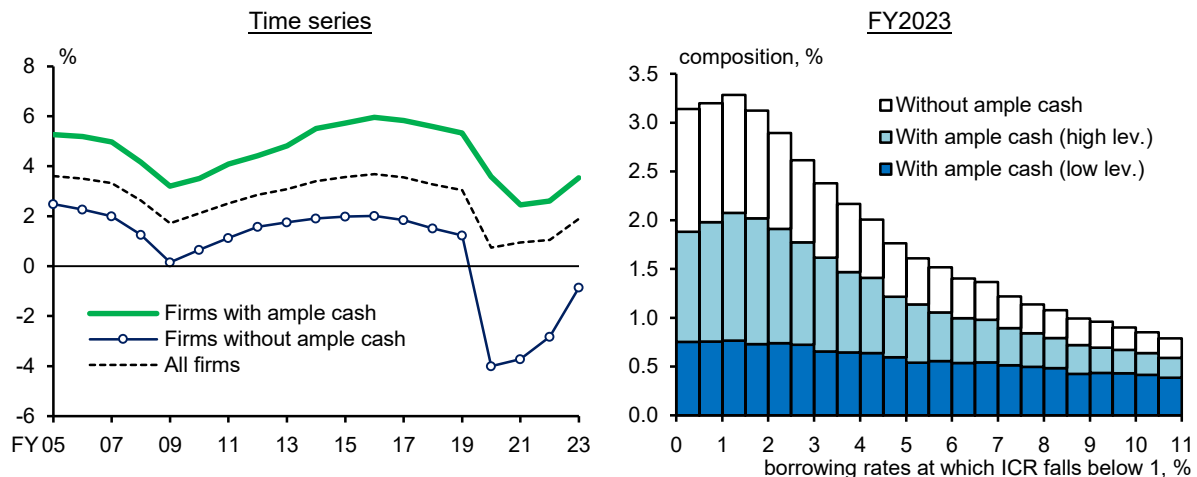
Rising yen interest rates are likely to improve banks' interest income balances overall from a somewhat longer-term perspective, including through changes in loan and deposit rates. However, there is some uncertainty regarding the impact on banks' profits, since the pass-through of interest rate rises to loan and deposit rates depends on the supply and demand balance and the competitive environment in the loan and deposit markets, on banks' capacity to provide financial services, and on banks' relationships with customers. When estimating the change in banks' pre-provision net revenue (PPNR) excluding trading income in response to rising yen interest rates, with some assumptions on the shape of the yield curve and interest rate pass-through to loan interest rates, there are cases where, depending on the scenario, banks' profits are suppressed downward temporarily, particularly among banks that have a large amount of fixed-rate loans and securities with a long maturity; however, PPNR excluding trading income is likely to increase subsequently for all types of banks (Chart I-10).



With regard to households' resilience to rising interest rates, in recent years, the number of households with housing loans has been increasing among younger age groups, for which debt servicing ratio (DSR) -- the ratio of annual repayments to annual income -- is generally high. That said, rules to prevent drastic changes in payments for housing loans, such as the "5-year rule" and the "125 percent rule," act to curb short-term increases in the repayment burden. In the somewhat longer run, the increase in the repayment burden will also be gradually mitigated as the economy continues to recover moderately and wages continue to increase.

As for firms' resilience to rising interest rates, the level of borrowing rates at which the interest coverage ratio (ICR) -- representing a firm's interest payment capacity -- falls below one has risen for firms on the whole, reflecting the recent recovery in profits; firms with ample cash are sufficiently profitable to withstand the burden of interest payments even at considerably high interest rates (Chart I-11). On the other hand, among the limited number of firms whose ICR falls below one with a borrowing rate near the current level, there are firms that are vulnerable to the burden of interest payments, such as those without ample cash or those with high leverage ratios despite having ample cash.

**Chart I-11: Borrowing rates at which ICR falls below 1 (SMEs with excess borrowings)**



Note: Covers SMEs with excess borrowings (firms with interest-bearing debt of more than their cash and deposits). Firms with cash reserves of less than half of their annual administrative expenses are grouped as "Firms without ample cash" and other firms as "Firms with ample cash." See Chart IV-1-16.

The Bank will promote financial institutions' initiatives to address these potential vulnerabilities through on-site examinations and off-site monitoring. It will continue to closely monitor the impact of various risk-taking moves by financial institutions on the financial system from a macroprudential perspective.

## II. Risks observed in financial and capital markets

- Looking at developments during the first half of fiscal 2024, market sentiment in global financial markets remained generally favorable from April to July but deteriorated rapidly at the beginning of August, as seen in the worldwide decline in stock prices, due to heightened concerns over a slowdown in the U.S. economy.<sup>1</sup> However, prices of risky assets have subsequently risen again.
- While Japanese financial markets were generally stable from April to July, stock prices declined significantly at the beginning of August, affected by the rapid deterioration in market sentiment in global financial markets, among other factors. However, stock prices have subsequently risen from the significantly lowered level at the beginning of August. Although the dollar/yen exchange rate fluctuated somewhat significantly in both directions, affected by the accumulation and unwinding of yen carry positions, among other factors, the yen appreciated against the dollar over the first half of fiscal 2024.
- Uncertainty about financial markets remains high. There have been concerns in domestic and foreign financial markets over the cumulative effects of the substantial policy rate hikes in the United States and Europe on economic activity and financial systems. There have also been concerns about uncertainty over the U.S. economy and its fiscal management. Furthermore, market participants have paid attention to geopolitical risks and developments in major high-tech stocks. In this situation, attention should continue to be paid to the possibility that global financial conditions could tighten through such factors as repricing of risky assets and a deterioration in the dollar funding environment.

### A. Global financial markets

Looking back at developments in global financial markets during the first half of fiscal 2024, market sentiment remained generally favorable from April to July but deteriorated rapidly at the beginning of August, as seen in the worldwide decline in stock prices, due to heightened concerns over a slowdown in the U.S. economy.<sup>2</sup> However, prices of risky assets have subsequently risen again.

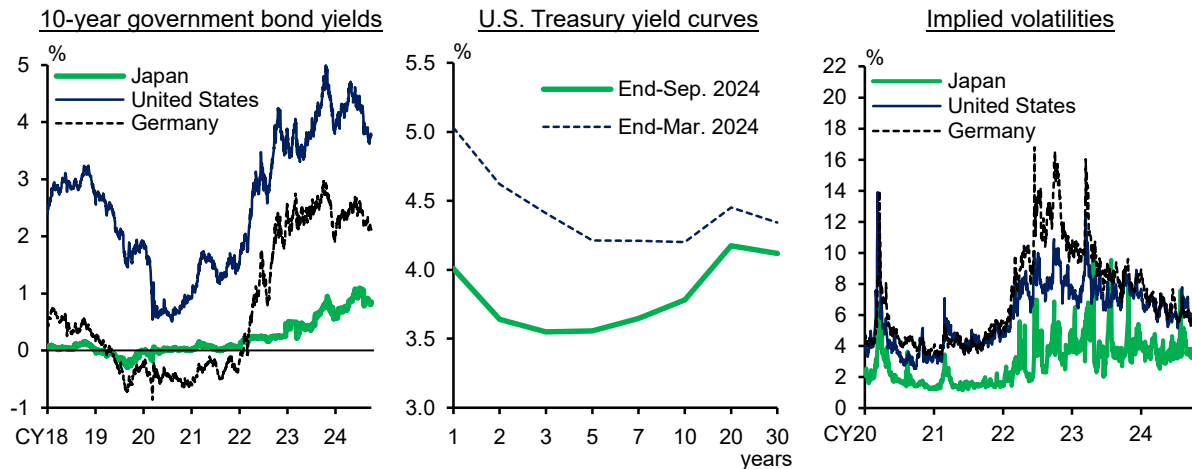
#### *U.S. and European bond markets*

U.S. long-term interest rates continued to rise from the beginning of 2024, due to speculation that the Federal Reserve's monetary tightening would be prolonged; however, yields have declined since May, as such speculation has waned, reflecting factors such as the deceleration in the inflation indicators and weaker-than-expected economic indicators (Chart II-1-1). The yield curve for U.S. Treasuries has also shifted downward across a wide range of maturities. Meanwhile, implied volatilities of government bond futures increased in both the United States and Europe at the beginning of August, due to the rapid deterioration in market sentiment; however, they have subsequently decreased.

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

<sup>2</sup> See Box 1 for the factors behind the volatility in financial and foreign exchange markets at the beginning of August.

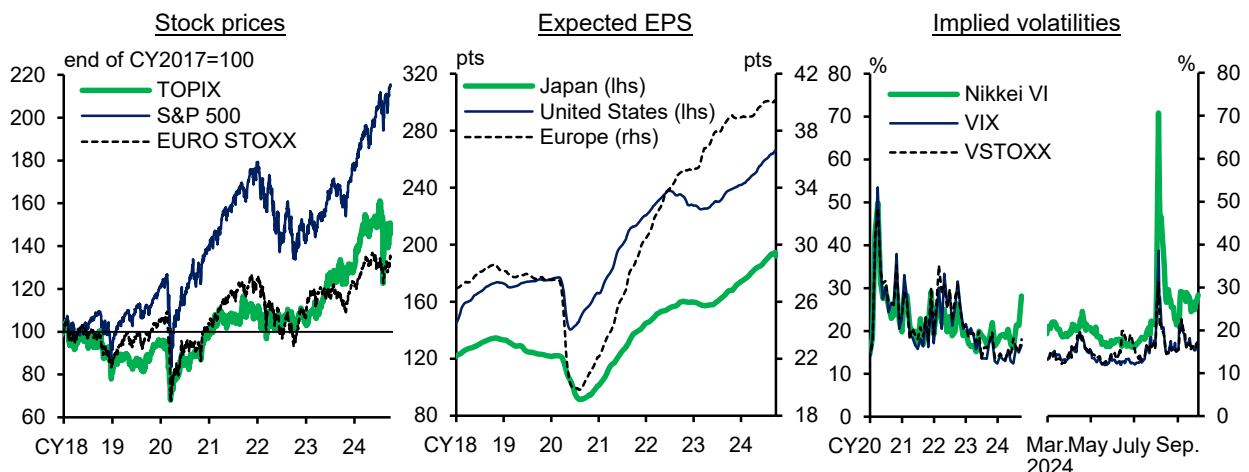
**Chart II-1-1: Bond markets**

Note: In the right-hand chart, implied volatilities are calculated from options on government bond futures. Latest data for the left- and right-hand charts are as of end-September 2024.

Source: Bloomberg.

### U.S. and European stock markets

U.S. stock prices rose, as market participants favored a decline in long-term interest rates; however, stock prices declined at the beginning of August due to the rapid deterioration in market sentiment (Chart II-1-2). Stock prices have subsequently risen again, mainly because overly pessimistic views on the outlook for the U.S. economy have receded. Expected earnings per share (EPS) for U.S. firms have continued to rise, mainly led by major high-tech stocks, owing to market expectations for a spread of generative artificial intelligence (AI) and other new technologies. Meanwhile, implied volatilities of U.S. and European stock prices increased at the beginning of August, reflecting the rapid deterioration in market sentiment; however, they have subsequently started to become stable, having declined below 20, a level regarded as a critical mark.

**Chart II-1-2: Stock markets**

Note: 1. In the middle chart, the data for Japan, the 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 of end-September 2024.

Source: Bloomberg; LSEG Datastream.

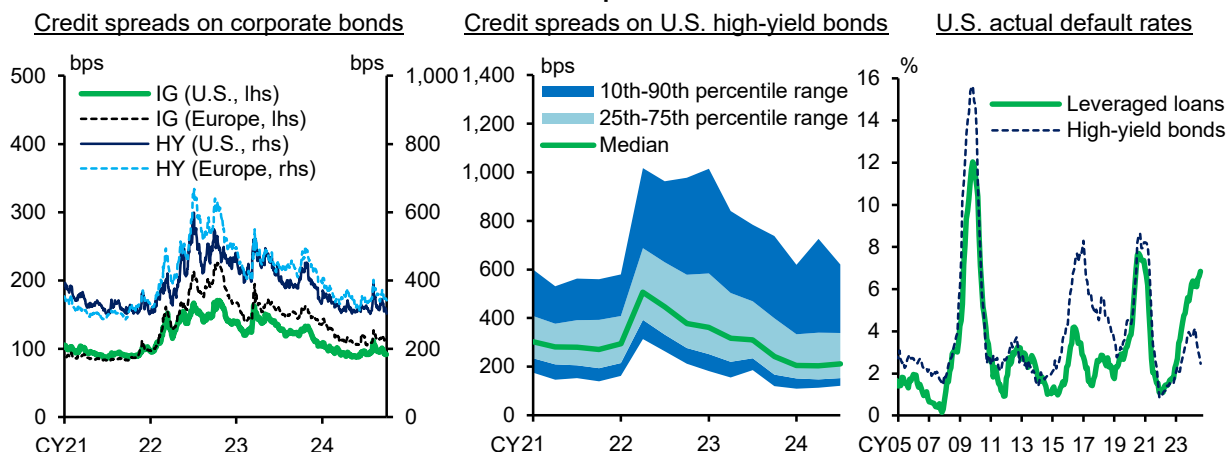
## II. Risks observed in financial and capital markets

### A. Global financial markets

#### *U.S. and European credit markets*

In U.S. and European credit markets, credit spreads on both investment-grade bonds and high-yield bonds expanded at the beginning of August, reflecting the deterioration in market sentiment; however, they have subsequently narrowed (left panel of Chart II-1-3). Credit spreads on U.S. high-yield bonds have remained at low levels on the whole. However, spreads on some of these bonds have been significantly wide, mainly due to the cumulative effects of monetary tightening (middle panel of Chart II-1-3). While the default rates of leveraged loans have risen, those of high-yield bonds have declined (right panel of Chart II-1-3).

**Chart II-1-3: Corporate bond markets**

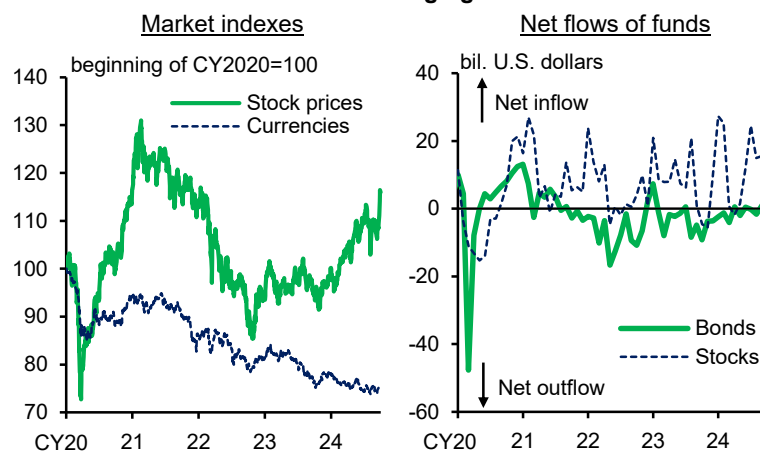


Note: 1. In the left-hand chart, "IG" and "HY" indicate investment-grade bonds and high-yield bonds, respectively. Latest data as of end-September 2024.  
 2. The middle chart is based on data by issue. Latest data as of end-September 2024.  
 3. The right-hand chart indicates trailing 12-month default rates. Latest data as of August 2024.  
 Source: ICE Data Indices, LLC; Moody's Ratings.

#### *Emerging markets and international commodity markets*

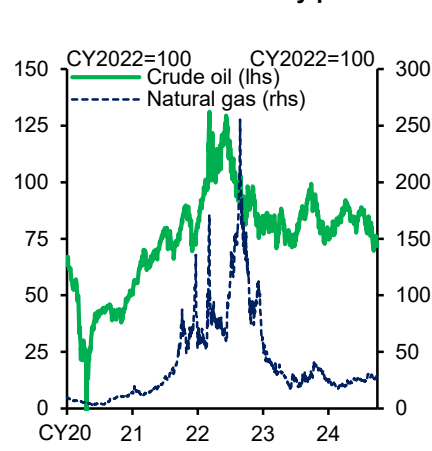
In emerging markets, stock prices rose over the first half of fiscal 2024, moving in tandem with U.S. stock prices. Currencies have been more or less flat (Chart II-1-4). Looking at net flows of emerging

**Chart II-1-4: Emerging markets**



Note: 1. In the left-hand chart, "Stock prices" and "Currencies" indicate the MSCI EM Local Index and the J.P. Morgan EMCI Index, respectively.  
 2. Latest data for the left- and right-hand charts are as of end-September 2024 and September 2024, respectively.  
 Source: Bloomberg; EPFR; Haver Analytics.

**Chart II-1-5: Commodity prices**



Note: "Crude oil" and "Natural gas" indicate WTI crude oil futures and Dutch TTF futures, respectively. Latest data as of end-September 2024.  
 Source: Bloomberg.

market funds, outflows from bond funds observed in 2023 have ceased amid diminished speculation that the Federal Reserve's monetary tightening would be prolonged, while equity funds have seen net inflows.

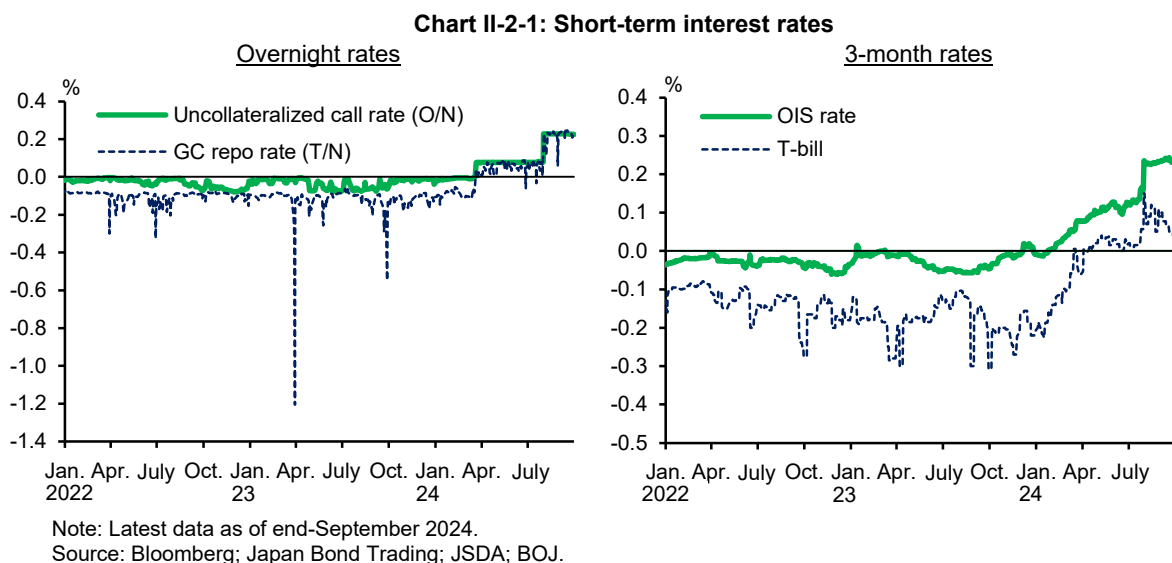
In international commodity markets, prices of crude oil declined over the first half of 2024, mainly due to concerns over economic slowdowns in the United States and China, although they temporarily went up against the background of intensified tensions in the Middle East (Chart II-1-5). Prices of natural gas have risen, as market attention has been drawn again to geopolitical risks regarding the situation surrounding Ukraine.

## B. Japanese financial markets

While Japanese financial markets were generally stable from April to July, stock prices declined significantly at the beginning of August, affected by the rapid deterioration in market sentiment in global financial markets, among other factors. However, stock prices have subsequently risen from the significantly lowered level at the beginning of August. Although the dollar/yen exchange rate fluctuated somewhat significantly in both directions, affected by the accumulation and unwinding of yen carry positions, among other factors, the yen appreciated against the dollar over the first half of fiscal 2024.

### Short-term money markets

Regarding overnight interest rates, the uncollateralized overnight call rate has been in line with the Bank of Japan's guideline for market operations (left panel of Chart II-2-1). Specifically, the uncollateralized overnight call rate was in the range of 0 to 0.1 percent after the changes in the Bank's monetary policy framework in March 2024, and has been at around 0.25 percent since the Bank changed its guideline for market operations in July.<sup>3</sup> The GC repo rate has fluctuated reflecting the size of the needs for securities companies to finance their bond inventories but generally moved in tandem with the uncollateralized call rate.



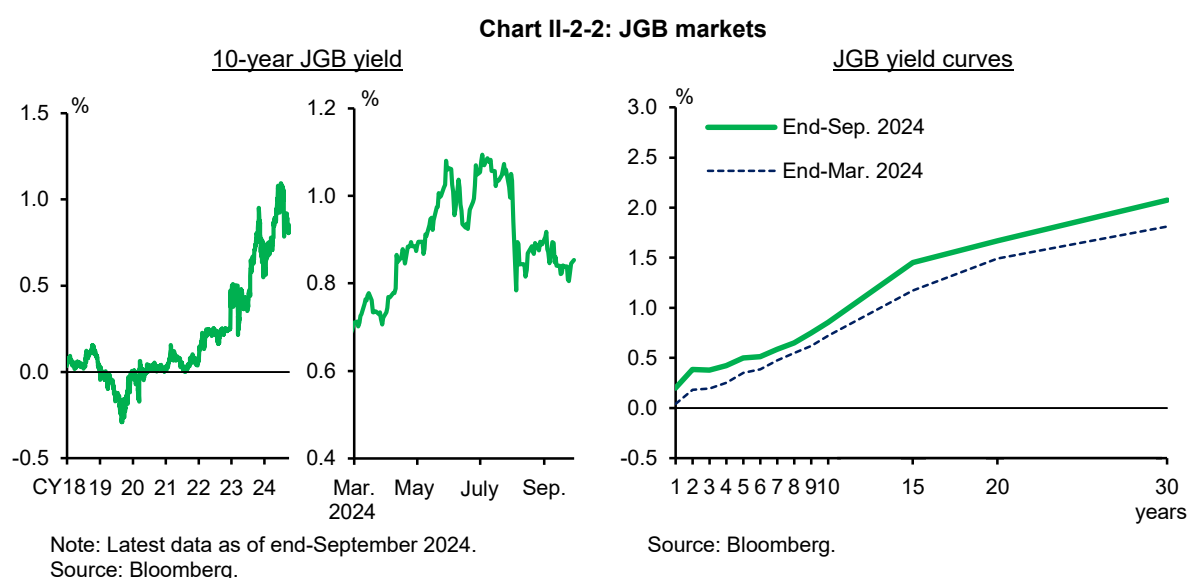
<sup>3</sup> For developments in short-term money markets after the changes in the monetary policy framework in March 2024, see Financial Markets Department of the Bank, "Developments in the Japanese Money Markets and their Functioning with Excess Reserves -- Including Developments after the Termination of the Negative Interest Rate Policy --" (tentative), forthcoming in English, and "Market Operations in Fiscal 2023."



With regard to term interest rates, the 3-month overnight index swap rate has risen, reflecting the changes to the Bank's guideline for market operations and market participants' outlook for the policy interest rate (right panel of Chart II-2-1). Meanwhile, yields on 3-month T-bills have been at relatively low levels, mainly due to continued demand from foreign investors and collateral demand from domestic investors.

### Japanese government bond (JGB) markets

Long-term interest rates rose, with attention being paid to the Bank's reduction in its JGB purchases and policy interest rate hikes, but subsequently declined at the beginning of August, due to the deterioration in market sentiment. The rates have moved in tandem with U.S. interest rates since then (Chart II-2-2).<sup>4</sup> The yield curve for JGBs shifted upward over the first half of fiscal 2024. In the meantime, the implied volatility of JGB futures has been at a high level (Chart II-1-1).



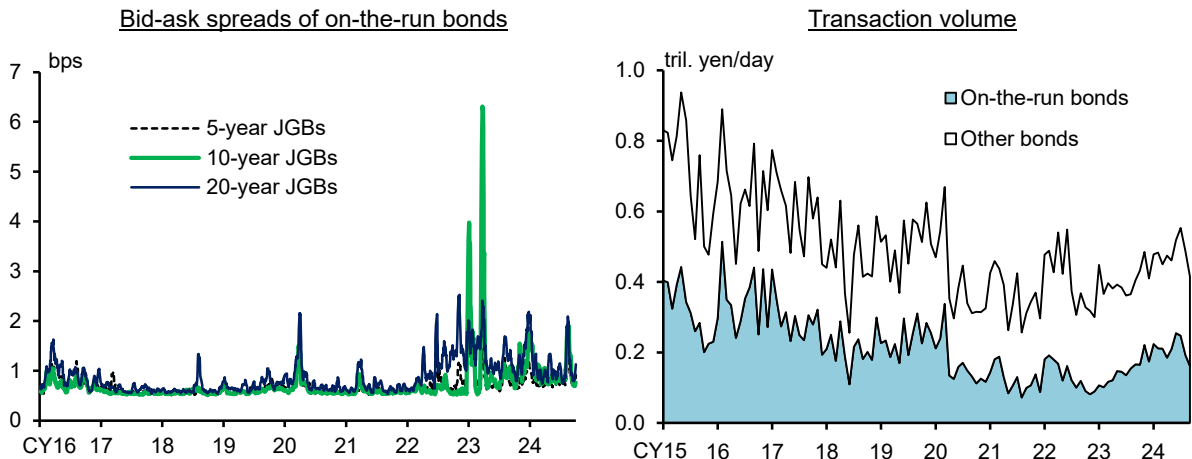
### Liquidity and functioning of JGB markets

The liquidity and functioning of JGB markets improved from April but temporarily deteriorated at the beginning of August, when many markets became highly volatile; however, these indicators have subsequently shown improvement again.<sup>5</sup> Looking at liquidity indicators in JGB markets, bid-ask spreads of newly issued bonds have improved on the whole, although they temporarily deteriorated at the beginning of August (Chart II-2-3). Although transaction volume for cash JGBs continued on an uptrend, it has declined since August partly due to some market participants holding back on trading. Market depth and resiliency in the JGB futures market deteriorated at the beginning of August 2024, but they have generally remained at improved levels compared with the significant deterioration around the beginning of 2023 (Chart II-2-4). According to the *Bond Market Survey*, the diffusion index for the degree of bond market functioning from the surveyed institutions' viewpoint has continued to improve, despite remaining negative (Chart II-2-5).

<sup>4</sup> At the Monetary Policy Meeting (MPM) held in June, the Bank decided that it would reduce its purchase amount of JGBs. After collecting views from market participants, the Bank decided on a detailed plan for the reduction of its purchase amount at the MPM held in July.

<sup>5</sup> See "Liquidity Indicators in the JGB Markets" on the Bank's website. The Financial Markets Department of the Bank generally updates and releases liquidity indicators of the JGB markets on a quarterly basis.

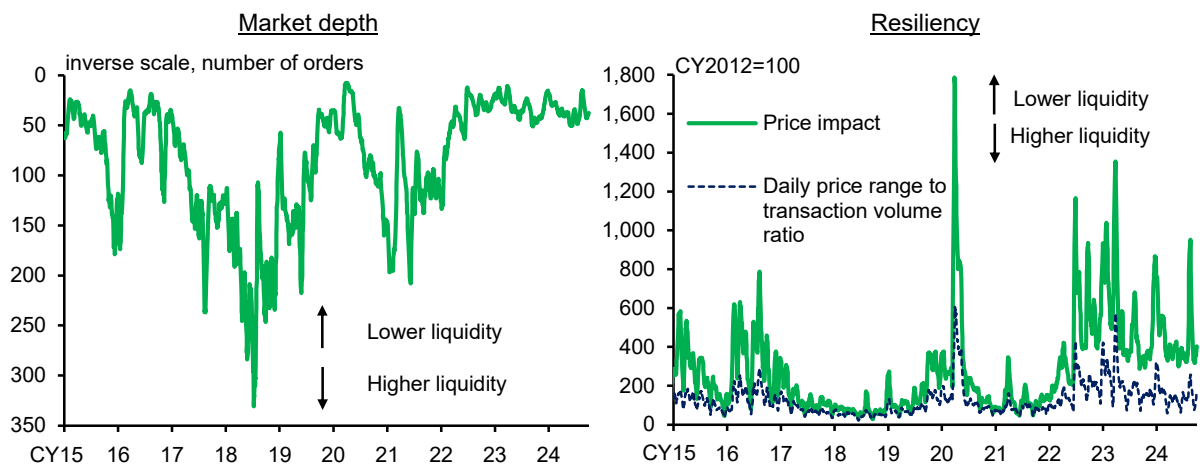


**Chart II-2-3: Liquidity indicators in JGB cash market**

Note: 1. The left-hand chart indicates the average of bid-ask spreads of inter-dealer transactions with a 1-second frequency. Bid-ask spreads are calculated only for time periods in which both best-bid and best-ask prices were submitted. 10-day backward moving averages. Latest data as of end-September 2024.

2. The right-hand chart indicates inter-dealer transaction volume for cash JGBs (2-, 5-, 10-, 20-, 30-, and 40-year JGBs) via Japan Bond Trading. Latest data as of September 2024.

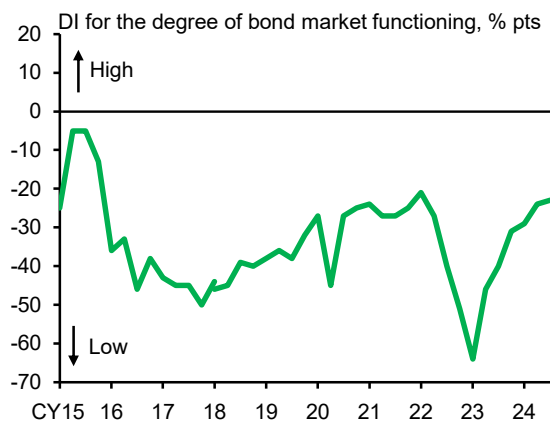
Source: Japan Bond Trading; QUICK.

**Chart II-2-4: Liquidity indicators in JGB futures market**

Note: 1. The left-hand chart indicates the number of orders for JGB futures at the best-ask price with a 1-minute frequency (median for each business day). 10-day backward moving averages. Latest data as of end-September 2024.

2. In the right-hand chart, "Price impact" is the average price impact with a 5-minute frequency. "Daily price range to transaction volume ratio" is a daily price range (difference between the highest and the lowest prices) divided by transaction volume. 10-day backward moving averages. Latest data as of end-September 2024.

Source: Nikkei Inc., "NIKKEI NEEDS"; Osaka Exchange; QUICK.

**Chart II-2-5: 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 August 2024 survey.

Source: BOJ.

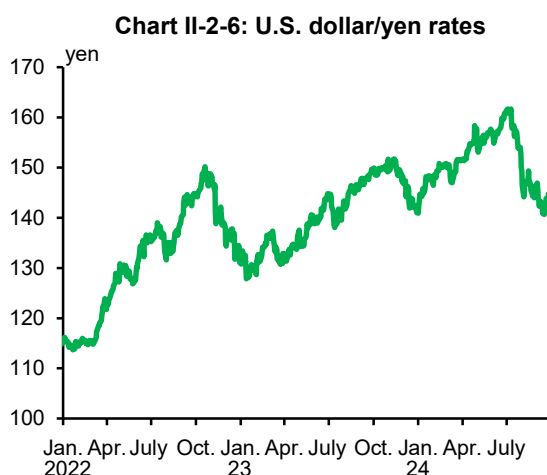
## II. Risks observed in financial and capital markets

### B. Japanese financial markets

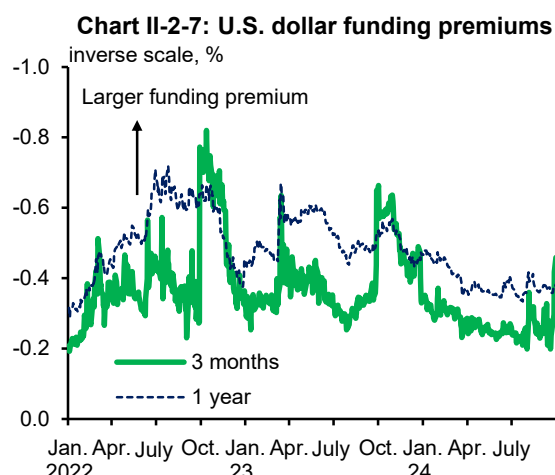
It is not straightforward, however, to assess these indicators in the short term, because they tend to be volatile and are affected by developments in foreign bond markets. Bearing this in mind, close attention should continue to be paid to future developments, including how the Bank's reduction in its JGB purchases will influence the liquidity and functioning of JGB markets.

#### *FX, stock, and credit markets*

In FX markets, the yen appreciated against the dollar over the first half of fiscal 2024, although the dollar/yen rate fluctuated somewhat significantly in both directions, affected by the accumulation and unwinding of yen carry positions from which investors have attempted to take advantage of the yield differential between Japan and the United States, among other factors (Chart II-2-6). Dollar funding premiums in the FX swap market have been at low levels on the whole; they increased at the beginning of August, due to the deterioration in market sentiment, but subsequently declined (Chart II-2-7).<sup>6</sup>



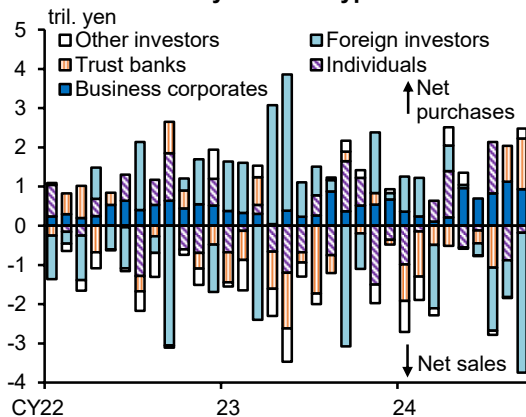
Note: Latest data as of end-September 2024.  
Source: Bloomberg.



Note: "3 months" refers to premiums on FX swaps (inverse scale). "1 year" refers to alpha of basis swaps. Latest data as of end-September 2024.  
Source: Bloomberg.

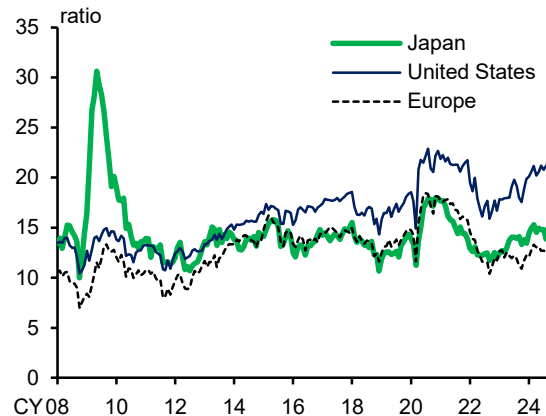
Japanese stock prices increased, owing to solid corporate financial results and expectations for corporate governance reforms as well as continuing stock buybacks by business corporates, with the Nikkei 225 Stock Average and the TOPIX hitting record highs at one point; however, they declined at the beginning of August, amid the rapid deterioration in market sentiment and the appreciation of the yen (Charts II-1-2 and II-2-8). Nonetheless, they have subsequently risen from the significantly lowered level seen at the beginning of August. Meanwhile, price-earnings (P/E) ratios have generally remained at the historical average level, although they temporarily declined due to the deterioration in market sentiment (Chart II-2-9).

<sup>6</sup> The widening of 3-month dollar funding premiums toward the end of September reflected transactions conducted in view of the year-end.

**Chart II-2-8: Japanese stock investments by investor type**

Note: The sum of net investments in cash and futures stock markets. Excludes securities companies. Latest data as of September 2024.

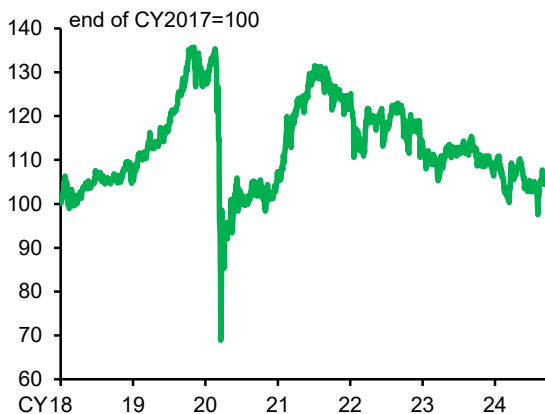
Source: Osaka Exchange; Tokyo Stock Exchange.

**Chart II-2-9: P/E ratios**

Note: The data for Japan, the United States, and Europe are calculated using expected EPS for the next 12 months of the TOPIX, the S&P 500, and the EURO STOXX, respectively. Latest data as of end-September 2024.

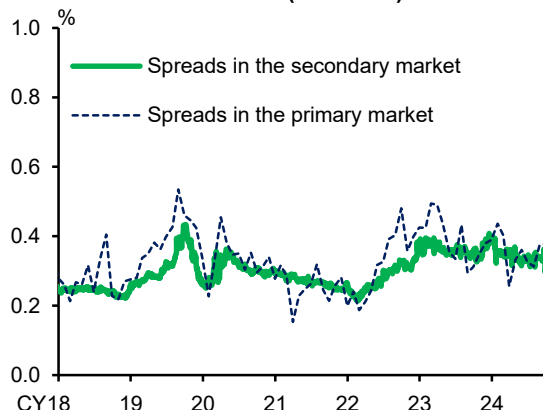
Source: LSEG Datastream.

Prices of Japan real estate investment trusts (J-REITs) declined over the first half of fiscal 2024, mainly due to the increase in domestic interest rates (Chart II-2-10).

**Chart II-2-10: Tokyo Stock Exchange REIT Index**

Note: Latest data as of end-September 2024.

Source: Bloomberg.

**Chart II-2-11: Credit spreads on corporate bonds (AA-rated)**

Note: 1. "Spreads in the secondary market" (daily data) indicates yield spreads of corporate bonds with remaining maturity of 3-7 years over government bonds. Latest data as of end-September 2024.  
2. "Spreads in the primary market" (monthly data) indicates yield spreads of newly issued corporate bonds with maturity of less than 15 years over government bonds. Bonds issued by banks and securities companies, etc. are excluded. Latest data as of September 2024.

Source: Bloomberg; Capital Eye; I-N Information Systems; JSDA; QUICK.

Yield spreads of corporate bonds in both the primary and secondary markets have been more or less flat (Chart II-2-11). Issuance rates for CP have risen, in tandem with short-term interest rates. The shortening of maturity of newly issued corporate bonds and CP has been observed, with attention being paid to a possible rise in interest rates.

## C. Risks to financial markets

Uncertainty about financial markets remains high. There have been concerns in domestic and foreign financial markets over the cumulative effects of the substantial policy rate hikes in the United States and Europe on economic activity and financial systems. In the U.S. short-term money market, market participants have been concerned about the possibility that the reduction in the Federal Reserve's balance sheet could exert upward pressure on interest rates. Moreover, amid uncertainty over the U.S. economy and its fiscal management, there have been concerns over the possibility that long-term interest rates could increase, led by rises in term premiums due to concerns about potential deterioration in fiscal balance.

In stock markets, market participants have paid attention to geopolitical risks and developments in investment capital, which has been piled into major high-tech stocks. In credit markets, there remain concerns over the cumulative effects of U.S. and European monetary tightening on financial conditions and funding of firms with low credit ratings and those with high leverage ratios. In the U.S. and European real estate industries, attention has been paid to developments in commercial real estate, reflecting the deterioration in the funding environment due to monetary tightening and weakening supply-demand conditions for office buildings.

In emerging markets, although concerns over capital outflows have eased somewhat, future developments continue to warrant close monitoring, particularly in countries with fiscal and financial vulnerability. In international commodity markets, attention needs to be paid to the impact of geopolitical factors, including the situation in the Middle East, and the slowdown in the Chinese economy on commodity and grain prices.

Attention should continue to be paid to the possibility that the materialization of these risks could lead to tightening in global financial conditions, such as repricing of risky assets and a deterioration in the dollar funding environment.

### III. Financial intermediation

- Financial intermediation has continued to function smoothly in Japan. Despite the increase in domestic lending rates, firms' demand for loans has continued to rise. Banks' lending stance has also been active. As for foreign lending, major banks have been selective amid concerns over downside risks to foreign economies. Meanwhile, banks have been cautious about making securities investment amid concerns over the risk of higher interest rates in Japan.
- Assets under management held by non-bank financial intermediaries (NBFIs) have remained on an uptrend. Investment funds' assets under management have continued to increase on the back of inflows of funds from households. Financial dealers and brokers' short-term repo transactions have continued to be seen on both the asset and liability sides. Meanwhile, while life insurance companies have accumulated holdings of super-long-term Japanese government bonds (JGBs) with the introduction of new regulations in mind, they have by and large finished making adjustments to comply with the new regulations.
- No major financial imbalances can be observed in these various financial intermediation activities. Regarding the financial gap, which captures the financial cycle, the positive gap has narrowed. However, given the continued strength of some real estate-related indexes, it is necessary to continue paying attention to future developments in the real estate market.

#### A. Financial intermediation by the banking sector

##### 1. Loans

The annual growth rate of domestic loans by privately-owned banks has remained around 3 percent (Chart III-1-1).<sup>7</sup> In addition to an increase in loan demand reflecting merger and acquisition (M&A) deals and demand for real estate-related loans, demand for working capital amid the recovery in economic activity has been rising. The lending of regional and *shinkin* banks is under downward pressure stemming from repayments on effectively interest-free and unsecured loans (so-called zero-zero loans). Loans to both large and medium-sized firms and small firms have continued to increase (Chart III-1-2).

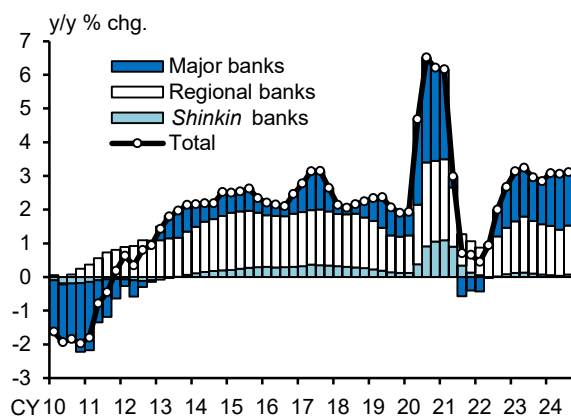
Meanwhile, banks' lending stance continues to be active. Major banks have been increasing their lending while ensuring loan profitability. Regional banks are also planning to increase lending with the aim of boosting their interest income on loans. Both major and regional banks have maintained their active lending stance, and no major or regional bank has tightened credit standards (left panel of Chart III-1-3). Banks' lending attitudes as perceived by both large and small firms have been accommodative (middle panel of Chart III-1-3). Firms' demand for loans as perceived by banks has also continued to rise (right panel of Chart III-1-3).

<sup>7</sup> Regarding corporate loans supported by public financing -- defined as the sum of loans by government-affiliated banks and loans by privately-owned banks guaranteed by credit guarantee corporations -- a factor that exerts downward pressure on the outstanding amount is the repayment of zero-zero loans. On the other hand, a factor that exerts upward pressure on the outstanding amount is loans related to support to improve firms' business conditions. Moreover, there have been requests for loans and repayment moratoria by firms affected by the Noto Peninsula Earthquake.

### III. Financial intermediation

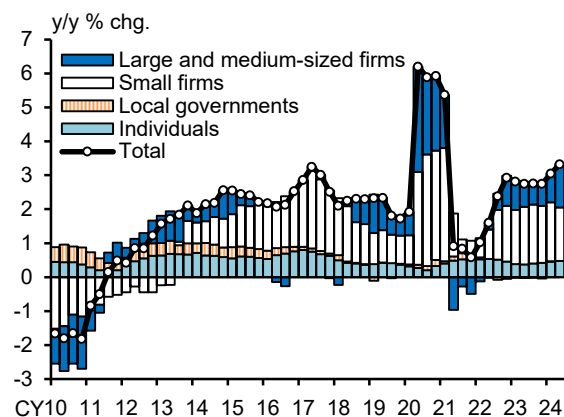
#### A. Financial intermediation by the banking sector

**Chart III-1-1: Banks' domestic loans outstanding**



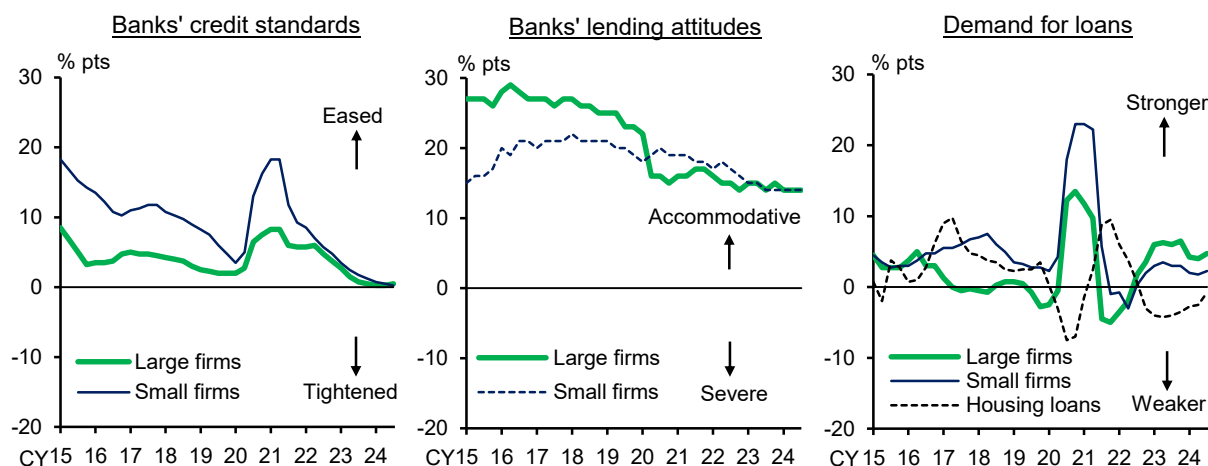
Note: Latest data as of July-August 2024.  
Source: BOJ.

**Chart III-1-2: Banks' loans outstanding by type of borrower**



Note: Loans to banks and insurance companies are excluded. Latest data as of end-June 2024.  
Source: BOJ.

**Chart III-1-3: Loan-related DIs**

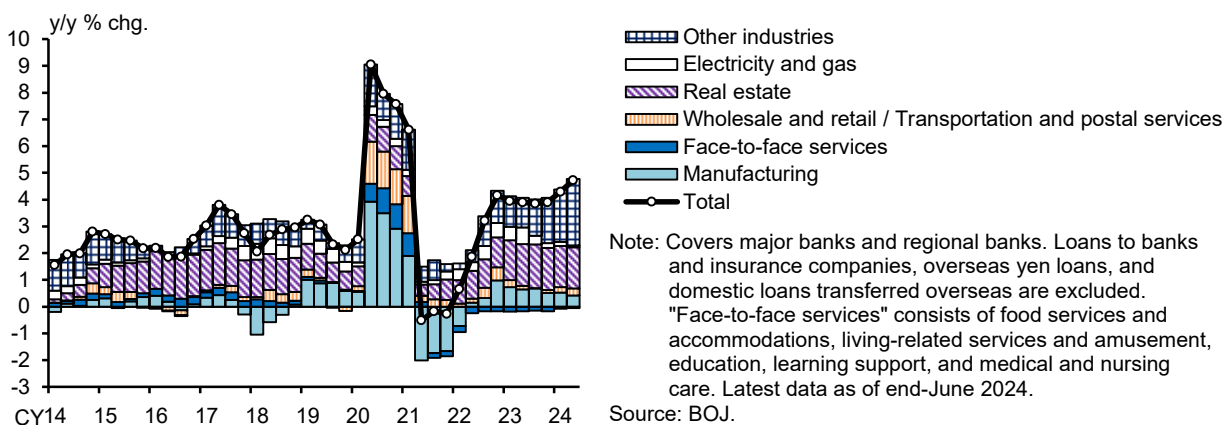


Note: 1. The left- and right-hand charts show 4-quarter backward moving averages. Latest data as of July 2024.  
2. Latest data for the middle chart are as of September 2024.  
Source: BOJ.

#### Loans by type of borrower

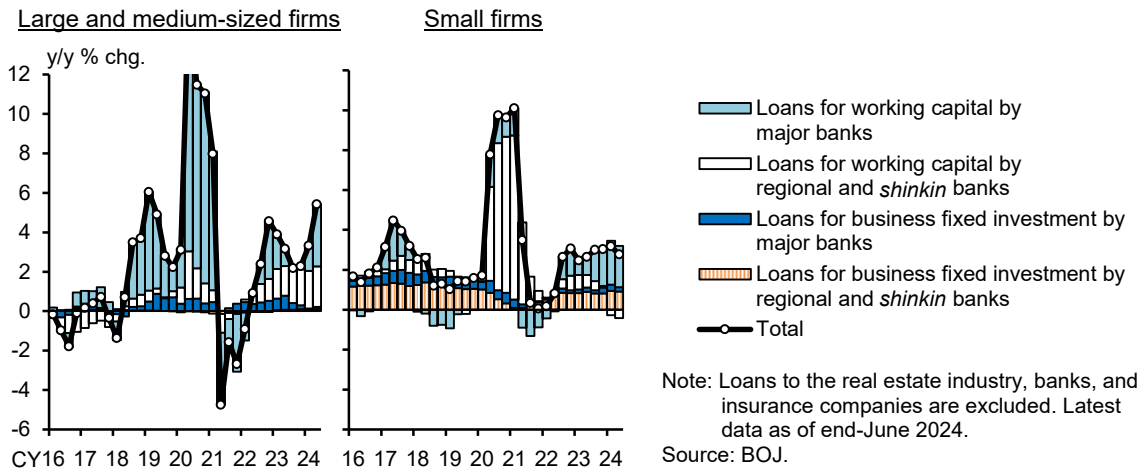
Loans to real estate businesses have continued to increase and loans to a wide range of other sectors, such as construction and information and communications, have increased, reflecting M&A deals (Chart III-1-4; construction and information and communications are included in "other

**Chart III-1-4: Corporate loans outstanding by industry**



Note: Covers major banks and regional banks. Loans to banks and insurance companies, overseas yen loans, and domestic loans transferred overseas are excluded. "Face-to-face services" consists of food services and accommodations, living-related services and amusement, education, learning support, and medical and nursing care. Latest data as of end-June 2024.  
Source: BOJ.

Chart III-1-5: Corporate loans outstanding by type of loan

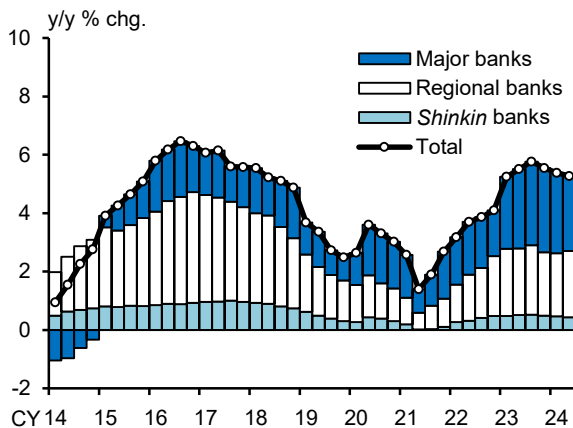


industries"). Growth in loans to the manufacturing and electricity and gas industries has decelerated, partly because demand for working capital has abated, with the waning of upward pressure on costs led by the past rise in import prices. As for working capital, while the loan growth rate has accelerated for large and medium-sized firms, it is unchanged for small firms (Chart III-1-5). Meanwhile, loans for business fixed investment have increased moderately, especially for small firms. In addition to the renewal investment along with the economic recovery, labor-saving investment to address labor shortages and fixed investment for decarbonization have contributed to this increase.

### Real estate-related loans

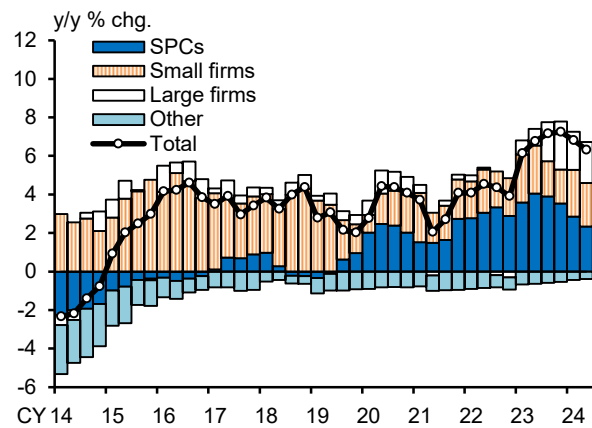
Loans to real estate businesses have continued to grow at a relatively high rate at both major and regional banks (Chart III-1-6). At major banks, loans to real estate investment funds and real estate investment trusts (REITs) with relatively high lending margins (where the former is represented by "SPCs" and the latter is included in "small firms" in Chart III-1-7) and loans to major real estate developers ("large firms" in the chart) have continued to increase. Major banks have managed credit exposures cautiously based on current real estate market conditions and past periods of market stress, and they have met solid demand for funds while paying attention to developments in interest rates and foreign exchange rates.

Chart III-1-6: Banks' real estate loans outstanding



Note: Latest data as of end-June 2024.  
Source: BOJ.

Chart III-1-7: Real estate loans by major banks



Note: "Small firms" includes REITs. Latest data as of end-June 2024.  
Source: BOJ.

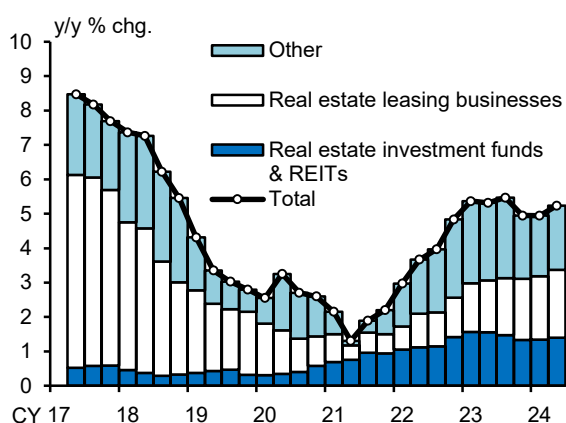


### III. Financial intermediation

#### A. Financial intermediation by the banking sector

At regional banks, loans to real estate investment funds have continued to show relatively high growth, reflecting an increase in financing demand due to the construction of new leasing properties such as office buildings and logistics facilities (Chart III-1-8).<sup>8</sup> Loans to real estate leasing businesses, which had decelerated during the pandemic, have been increasing moderately. On the other hand, some real estate sales agents (loans to these are included in "other" in the chart) have become cautious toward carrying out development projects such as condominium buildings, reflecting rising construction costs.

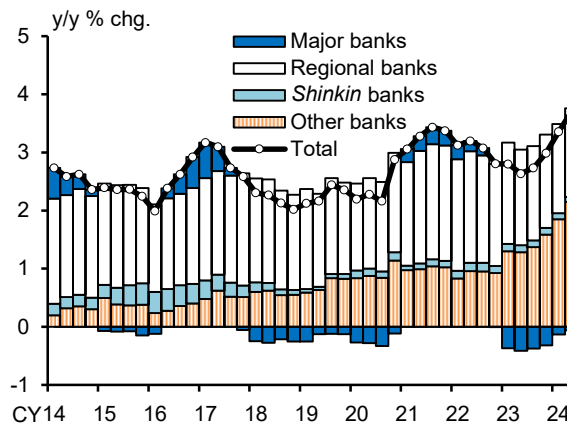
**Chart III-1-8: Real estate loans by regional banks**



Note: Covers 87 regional banks, for which a breakdown of real estate loans is available. "Real estate leasing businesses" is for residential use. Latest data as of end-June 2024.

Source: BOJ.

**Chart III-1-9: Banks' housing loans outstanding**



Note: "Other banks" covers domestically licensed banks but excludes major banks and regional banks. Latest data as of end-June 2024.

Source: BOJ.

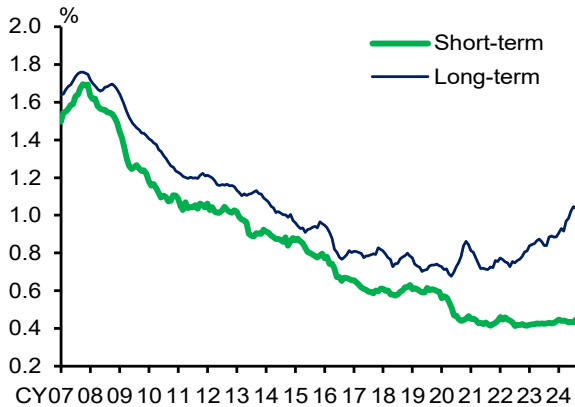
Housing loans, which account for a large share of loans to individuals, have continued to grow at a rate of 3-4 percent (Chart III-1-9). On the demand side, the outstanding amount of housing loans has been pushed up due to the larger amount per loan reflecting the rise in property prices. On the supply side, the increase in the outstanding amount has continued to be led by internet-only banks (included in "other banks" in the chart), which offer highly preferential interest rates. At major banks, housing loans have declined, partly because of their greater focus on profitability and resultant selective lending stance. At regional banks, the pace of increase in the outstanding amount has decelerated.

#### Loan interest rates

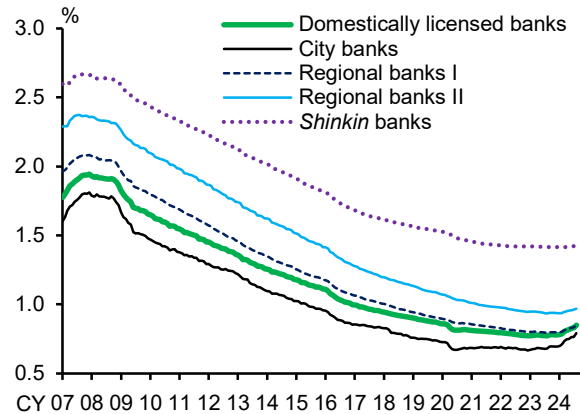
Banks' average contract interest rates on new loans and discounts have been rising, especially long-term ones (Chart III-1-10). This is due to the rise in market interest rates, which serve as base rates, and rises in market rate-linked and fixed interest rates have been pronounced so far. Interest rates on loans outstanding have also been rising. However, there have been differences depending on types of banks; for example, the size of the increase has been substantial for major banks, among which market rate-linked loans account for a large share of their lending (Charts III-1-11 and III-1-12). Meanwhile, interest rates on new fixed-rate housing loans have been at relatively high levels, while interest rates on floating-rate housing loans, which account for the majority of new housing loans, have been rising in tandem with reference rates such as short-term prime rates (Chart III-1-13).

<sup>8</sup> Looking at the breakdown of loans to real estate businesses by regional banks, loans to real estate leasing businesses account for half of total loans. Of these loans, the ratio of loans to individuals to corporate loans is 3:2. Loans to real estate investment funds account for only 10 percent. The remaining 40 percent includes various loans, including those to real estate sales agents.

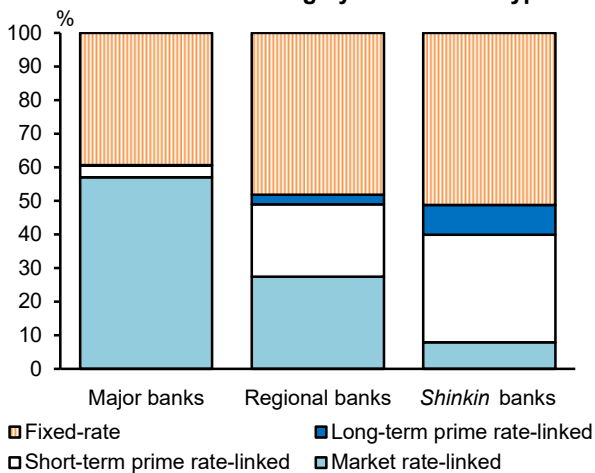


**Chart III-1-10: Average contract interest rates on new loans and discounts**

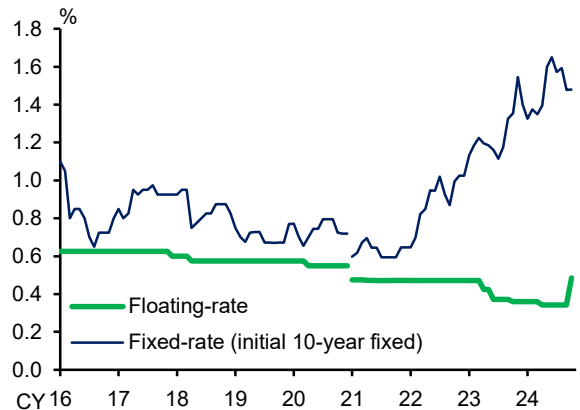
Note: Covers domestically licensed banks. 6-month backward moving averages. Latest data as of August 2024.  
Source: BOJ.

**Chart III-1-11: Average contract interest rates on outstanding loans and bills discounted**

Note: Latest data as of August 2024.  
Source: BOJ.

**Chart III-1-12: Composition of corporate loans outstanding by interest rate type**

Note: Data as of end-March 2024.  
Source: BOJ.

**Chart III-1-13: Interest rates on housing loans**

Note: Shows medians of some major banks (preferential rates are taken into account). Covers loans with administrative fees from 2021 and those with guarantee fees up to 2020. Latest data as of October 2024.  
Source: Published accounts of individual banks.

## Foreign loans

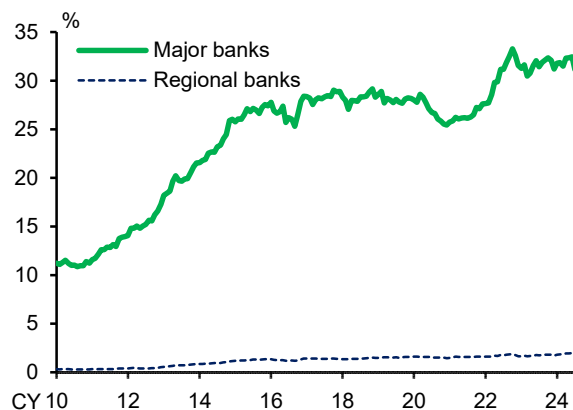
With foreign loans accounting for over 30 percent of their loan portfolios, major banks are susceptible to foreign financial and economic conditions (Chart III-1-14). Against this background, major banks have been selective in their foreign lending (Chart III-1-15). Concerns over downside risks to foreign economies and the correction risk in foreign real estate markets have also contributed to such lending stance.

On the demand side, loan demand has been sluggish in all regions while loan interest rates have been at high levels. On the supply side, reviews and the resultant reduction of loans to low-return borrowers at major banks have put downward pressure on lending.

### III. Financial intermediation

#### A. Financial intermediation by the banking sector

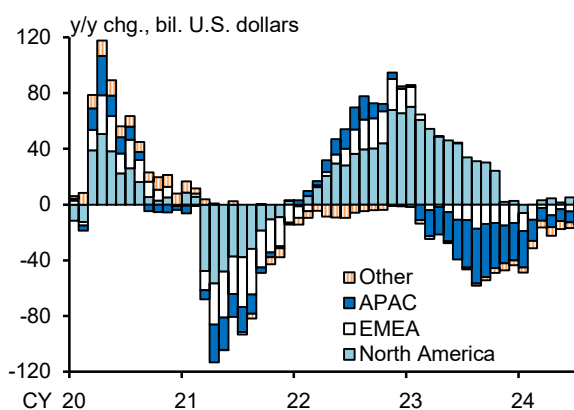
**Chart III-1-14: Share of foreign loans in total loans**



Note: On a non-consolidated basis. Latest data as of end-July 2024.

Source: BOJ.

**Chart III-1-15: Foreign loans outstanding of the three major banks by region**



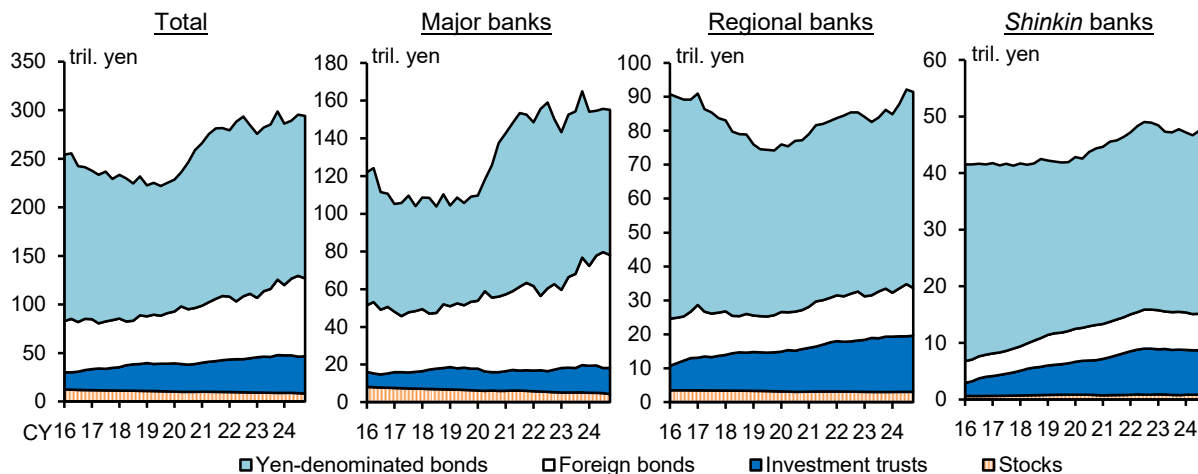
Note: Latest data as of end-July 2024.

Source: BOJ.

## 2. Securities investment

Banks have continued to make domestic securities investments in a risk-conservative manner amid concerns over the risk of higher interest rates (Chart III-1-16). As for foreign securities investment, some banks have been increasing their holdings with an eye on the timing of future interest rate cuts.

**Chart III-1-16: Outstanding amount of securities among banks**



Note: 1. "Investment trusts" includes domestic and foreign investment, and some securities other than investment trusts.  
2. "Stocks" is based on the outstanding amount on a book value basis and excludes foreign stocks.  
3. The data are the sum of figures for domestic and foreign branches, with the exception of those for major banks' "Stocks," which are figures for domestic branches. Latest data as of end-August 2024.

Source: BOJ.

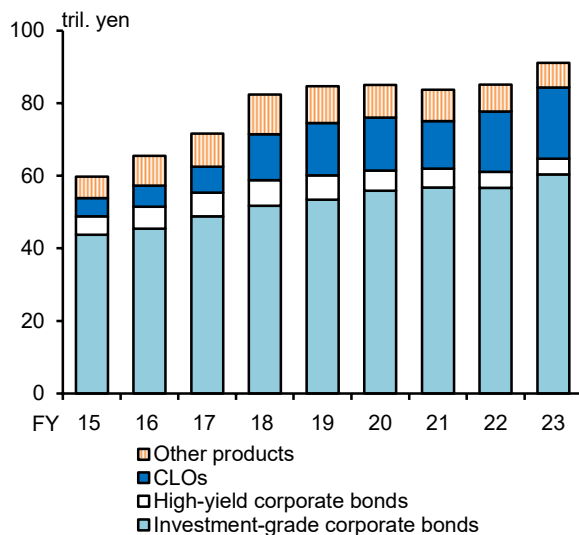
Major banks have held back from accumulating holdings of yen-denominated bonds, including JGBs, municipal bonds, and corporate bonds amid concerns over the risk of rising interest rates. They have continued with interest rate hedging by purchasing inverse mutual funds, for which net asset values increase when interest rates rise. Although they have maintained a more cautious stance toward investing in foreign bonds with foreign yield curves remaining inverted, based on the expectation that foreign interest rates will fall, some banks have accumulated holdings of foreign bonds with the aim of obtaining capital gains. 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.

Regional and *shinkin* banks have been increasing their holdings of yen-denominated bonds, led by regional banks. However, amid concerns over the risk of higher interest rates, both regional and *shinkin* banks have shortened the duration of their yen-denominated bondholdings by holding back investments in the longer-term zone. To curtail the risk of valuation losses, some banks have accumulated holdings of held-to-maturity bonds. As for foreign bonds, some banks have restored some of their positions that they had reduced, but the increase in holdings has been limited. Other banks have increased investment in domestic real estate funds with the aim of improving investment yields.

Banks have also been cautious about taking risks in foreign credit products. They have reduced positions in high-yield bonds to curb market credit risk, while their outstanding amount of investment in foreign credit products has increased, mainly due to an increase in investment-grade bonds (Chart III-1-17). Meanwhile, banks have continued to prefer collateralized loan obligations (CLOs), which offer floating-rate coupons, with a view to containing the risk of negative interest margins. Moreover, large financial institutions have increased their alternative investment holdings, such as private equity holdings, in order to diversify risk (Chart III-1-18).

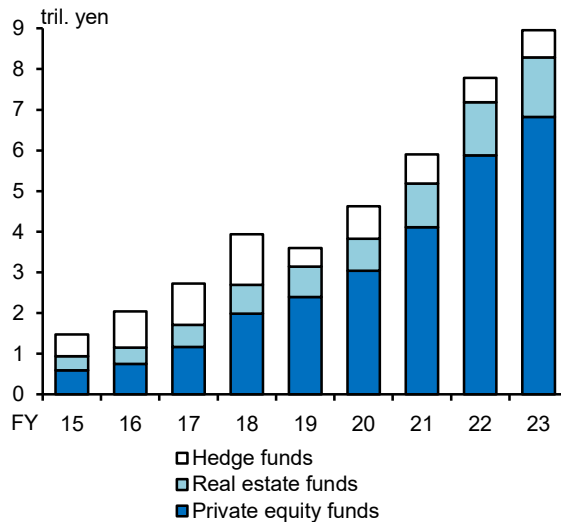
**Chart III-1-17: Foreign credit product investment**



Note: Covers major banks, regional banks, *shinkin* banks, Japan Post Bank, and a central organization of financial cooperatives.

Source: BOJ.

**Chart III-1-18: Foreign alternative investment**



Note: 1. Covers major banks, Japan Post Bank, and a central organization of financial cooperatives.

2. "Real estate funds" excludes publicly traded REITs.

Source: BOJ.

## B. Financial intermediation by the non-bank financial sector

In Japan, where depository financial institutions are still dominant in financial intermediation, the share of financial assets held by NBFIs has remained at about 30 percent.<sup>9</sup> However, assets under management held by NBFIs have remained on an uptrend (Chart III-2-1). Life insurance companies and financial dealers and brokers have continued to conduct repo transactions. The increase in

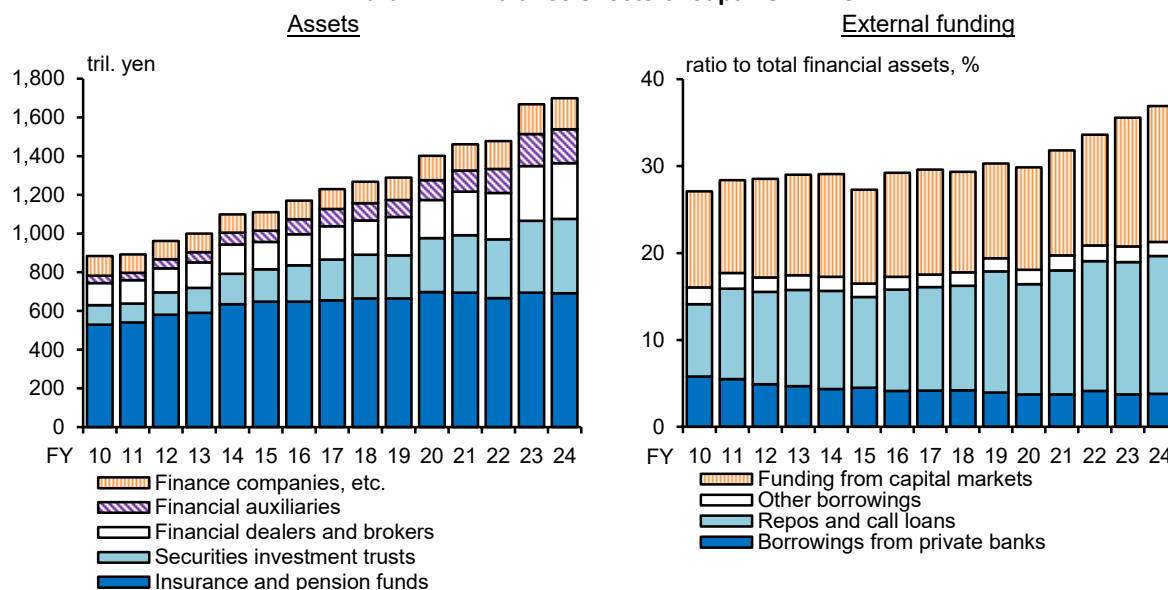
<sup>9</sup> The share of financial assets held by each entity in the financial system in Japan (globally) is 31 percent (47 percent) for NBFIs, 47 percent (40 percent) for depository financial institutions, 15 percent (8 percent) for central banks, and 7 percent (5 percent) for public financial institutions (figures are as of end-2023 for Japan and as of end-2022 globally). In line with the definition of the Financial Stability Board (FSB), NBFIs here include all financial institutions that are not depository financial institutions, central banks, or public financial institutions.

### III. Financial intermediation

#### B. Financial intermediation by the non-bank financial sector

assets under management and the resultant expansion in market funding have contributed to an increase in the interconnectedness between NBFIs and banks in Japan.

**Chart III-2-1: Balance sheets of Japan's NBFIs**



Note: "Financial auxiliaries" includes financial holding companies, stock exchanges, and financial instruments exchanges. "Finance companies, etc." includes finance companies, securities finance companies, and the Resolution and Collection Corporation. Latest data as of end-June 2024.

Source: BOJ.

#### *Insurance companies and pension funds*

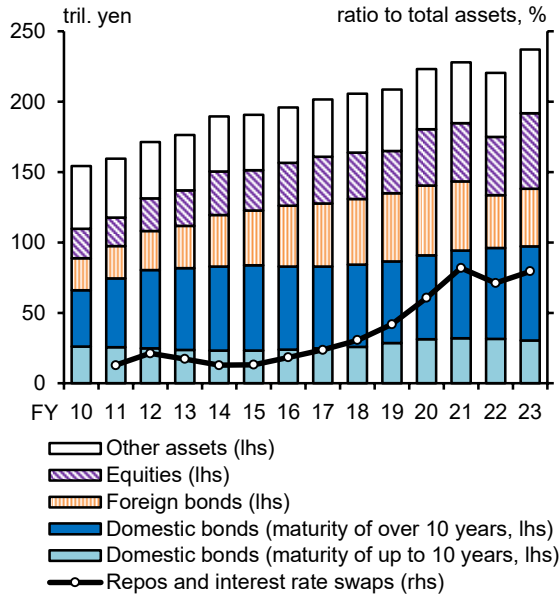
With the introduction of economic value-based solvency margin ratio (ESR) regulations in fiscal 2025 in mind, life insurance companies have worked on reducing the duration gap between assets and liabilities not only by accumulating holdings of super-long-term JGBs but also by using repo funding and interest rate swaps (Chart III-2-2). Against this background, they have by and large finished making adjustments to comply with the new regulations, and their average ESR has been above 200 percent. In addition, they have a certain level of cash and deposits as reserves for claims.

Looking at life insurance companies' valuation gains/losses on securities investment as of the end of June 2024, valuation losses on yen-denominated bondholdings have been increasing, reflecting the rise in domestic interest rates (Chart III-2-3). However, their securities holdings overall have continued to register substantial net valuation gains. Life insurance companies' valuation gains on stockholdings have expanded on the back of rising stock prices. They have also been able to make valuation gains on foreign bondholdings in yen-denominated basis even as foreign interest rates have risen, due partly to the effects of the yen's depreciation.<sup>10</sup> As for foreign bond positions, life insurance companies have reduced their holdings of currency-hedged foreign bonds, partly

<sup>10</sup> Life insurance companies' financial soundness amid the rise in interest rates has been the subject of debate worldwide. In particular, the increase in valuation losses on securities holdings as well as the rise in surrender of savings insurance policies and the resultant liquidity burden have been highlighted. Regarding valuation losses on securities holdings, in Japan, the composition of insurers' assets is such that valuation gains on stockholdings exceed valuation losses on bondholdings (Chart III-2-3). Moreover, under the current system, bonds that are managed so that changes in the market value of assets and liabilities due to interest rate fluctuations are matched are classified as policy-reserve-matching bonds and are allowed to be excluded from mark-to-market valuation. With regard to surrender, sales of savings insurance policies such as yen-denominated single-premium policies had been limited in Japan from 2016, when long-term interest rates fell substantially, since this made it difficult to secure the assumed rate of return.

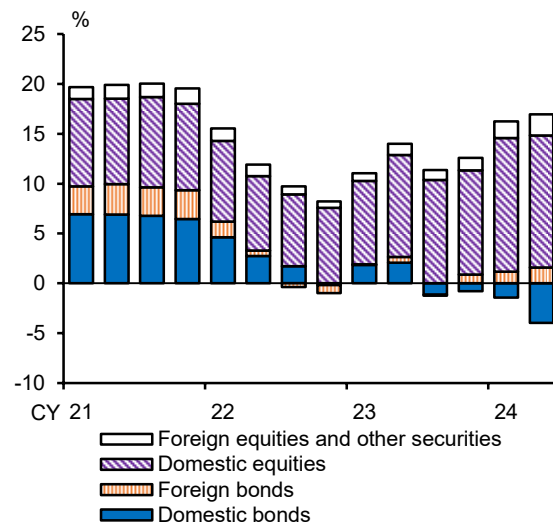
because foreign currency funding costs, including hedging costs, have remained high; on the other hand, they have increased their holdings of unhedged foreign bonds (Chart III-2-4).

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



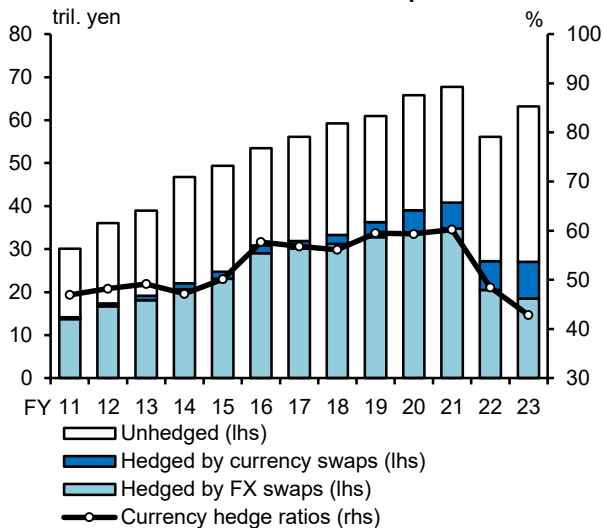
Note: 1. Covers nine major life insurance companies. Based on general accounts.  
2. Interest rate swaps indicate net positions calculated based on notional amounts.  
Source: Published accounts of individual companies.

**Chart III-2-3: Valuation gains/losses among life insurance companies**



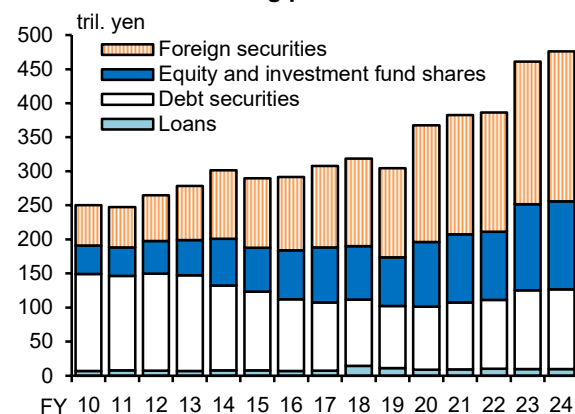
Note: Shows the ratio of valuation gains/losses on securities holdings, which excludes trading securities. Covers four major life insurance companies. Latest data as of end-June 2024.  
Source: Published accounts of individual companies.

**Chart III-2-4: Currency hedge ratios among life insurance companies**



Note: Covers nine major life insurance companies. Estimated based on general accounts.  
"Unhedged" includes foreign bonds earmarked for foreign currency-denominated insurance.  
Source: Published accounts of individual companies.

**Chart III-2-5: Investment assets outstanding among pension funds**



Note: Covers pension funds and public pensions. Latest data as of end-June 2024.  
Source: BOJ.

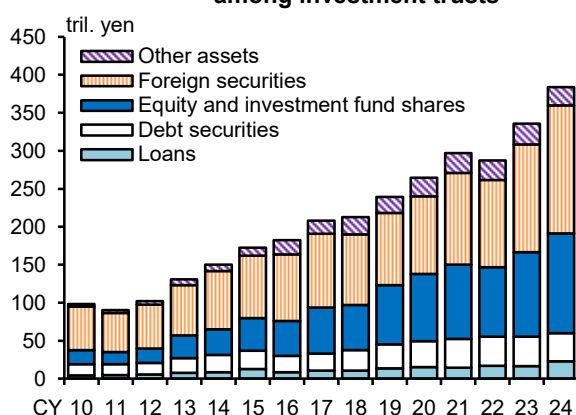
Corporate pension funds have maintained their cautious investment stance without depending on leverage, with many of them having secured net assets in excess of policy reserves. The Government Pension Investment Fund (GPIF), which is in charge of managing the assets of public pension funds such as employees' pension funds and the national pension fund, has been

rebalancing its portfolio (Chart III-2-5).<sup>11</sup> This is 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.

### Investment funds

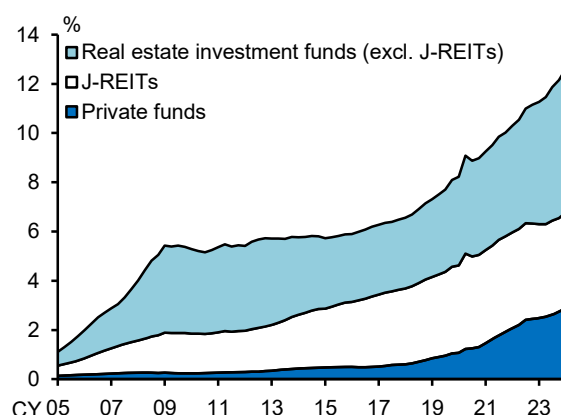
Investment funds' assets under management, especially those of securities investment trusts, have continued to increase on the back of inflows of funds from households (Chart III-2-6). With the introduction of the new Nippon Individual Savings Account (NISA) program this year, inflows of funds into eligible financial products have been increasing. Meanwhile, the assets under management of leveraged private funds and real estate funds have increased (Chart III-2-7).<sup>12</sup>

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



Note: Latest data as of end-June 2024.  
Source: BOJ.

**Chart III-2-7: Fund assets to GDP ratio**



Note: 4-quarter backward moving averages. Latest data as of the April-June quarter of 2024.  
Source: Cabinet Office; Preqin; Sumitomo Mitsui Trust Research Institute; The Investment Trusts Association, Japan.

### Financial dealers and brokers

Financial dealers and brokers' positions have expanded, mainly reflecting the increase in short-term repo transactions on both the asset and liability sides (Chart III-2-8).<sup>13</sup> This is because, with transaction activity having increased following the increase in interest rate fluctuations, Japanese securities companies and *tanshi* companies (money market brokers) have carried out repo transactions for inventory financing and have also increased repo transactions to meet the rise in demand from customers who need to borrow bonds. Moreover, there has been an increase in repo

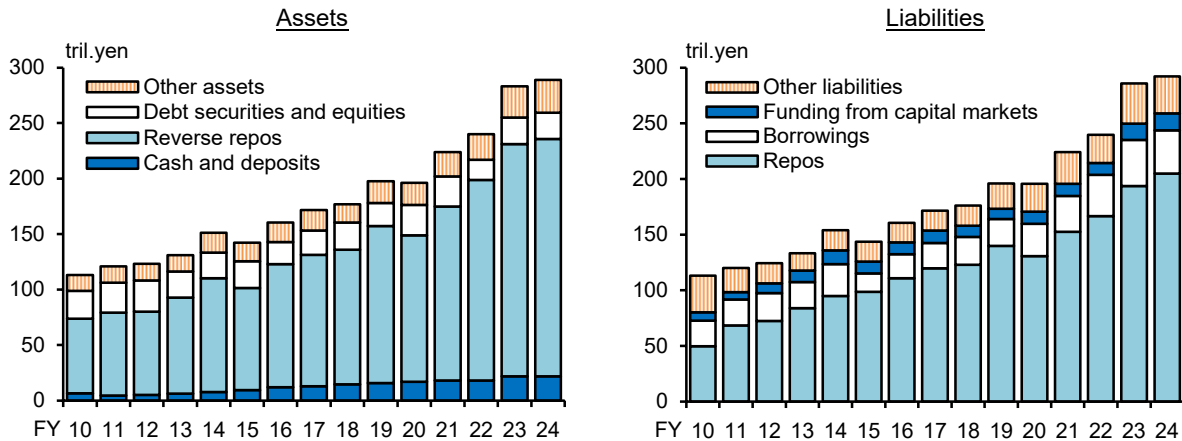
<sup>11</sup> Japan's pension funds primarily follow simple investment strategies consistent with the policy asset mix or the basic portfolio allocation instead of strategies that make use of leverage, such as liability-driven investment strategies. For details, see Ito, Y., Kasai, Y., Todoroki, R., Toyoda, A., and Horie, R., "Corporate Pension Funds' Investment Strategies and Financial Stability: Lessons from the Turmoil in the UK Gilt Market," *Bank of Japan Review Series*, no. 2023-E-3, March 2023.

<sup>12</sup> Although the size of the private fund market in Japan is limited, private fund markets have been growing in recent years, especially in the United States and Europe. This growth has raised concerns about increased risks associated with private funds, such as a lack of transparency in fund management, the growing interconnectedness within the financial system, the build-up of vulnerabilities associated with rapid credit growth, and the liquidity risk observed in some open-end funds. For details on recent developments in and caveats regarding private funds, see Box 3 in the April 2024 issue of the *Report*.

<sup>13</sup> For details on off-balance-sheet transactions of financial dealers and brokers, see Inoue, S., Miki, S., and Gemma, Y., "The Japanese Yen Interest Rate Swap Market Observed from OTC Derivative Transaction Data: The Impact of COVID-19," *Bank of Japan Review Series*, no. 2021-E-3, September 2021.

transactions by foreign securities companies' branches in Japan to broker JGB transactions to meet their headquarters' demand for JGBs as collateral. There have also been repo transactions by foreign investors to invest in yen-denominated bonds. Although the size of the balance sheets of financial dealers and brokers has increased as a result of these transactions, there is no duration mismatch between their assets and liabilities.

**Chart III-2-8: Balance sheets of financial dealers and brokers**



Note: "Equities" includes investment fund shares. Latest data as of end-June 2024.

Source: BOJ.

## C. Financial cycle

As confirmed in the preceding sections, financial intermediation has continued to function smoothly in Japan. This section examines whether this financial intermediation and the resultant increase in private debt have led to a buildup of financial imbalances that could cause a significant downturn in future economic activity.

### 1. The financial cycle and risks to economic growth

A heat map and the financial gap are used to assess whether the current phase of the financial cycle shows any signs of overheating or contraction. The heat map depicts whether various Financial Activity Indexes (FAIXs) point to an overheating or contraction of activity using the bubble period in the late 1980s as reference, indicating financial conditions in three different colors (Chart III-3-1).<sup>14</sup> The latest heat map shows that, although 3 FAIXs related to the stock market are "red," 11 out of the 14 FAIXs are "green."<sup>15</sup> Against this background, the financial gap -- a summary measure of the 14 FAIXs that is calculated as the weighted average of the deviations of the 14 FAIXs from their trends -- shows that the positive gap has remained narrower than a while ago

<sup>14</sup> The heat map in Chart III-3-1 represents a mechanical assessment of whether financial activity is overheating or contracting. Specifically, the colors represent the following: (1) red indicates that an index is above its upper threshold; (2) blue indicates that an index 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.

<sup>15</sup> Compared with the previous *Report*, *stock purchases on margin to sales on margin ratio* and *equity weighting in institutional investors' portfolios* have turned "red." As for indexes other than those related to the stock market, *total credit to GDP ratio* temporarily turned "red" but most recently has switched to "green" again. This is mainly because nominal GDP -- the denominator of the ratio -- had declined in the first quarter of 2024 due to temporary factors.

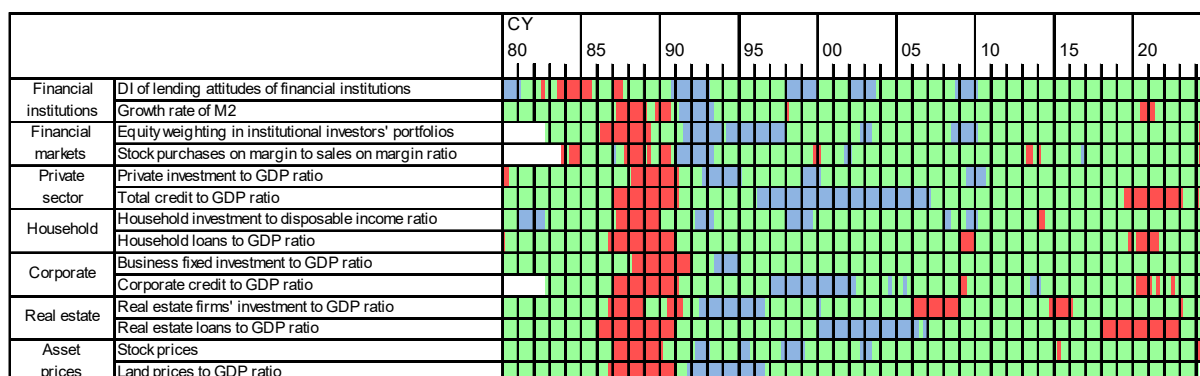


### III. Financial intermediation

#### C. Financial cycle

(Chart III-3-2).<sup>16</sup> A breakdown of the financial gap shows that the contribution of the "debt factor" has been on a declining trend; this is because even though credit extended by banks has continued to increase, nominal GDP, which shows the level of economic activity, has grown at a solid pace as well. The contribution of the "debt factor" has also been low compared to around 2019, before the pandemic. The contribution of real investment due to leverage (included in "asset factor" in the chart) has remained limited. Thus, no major financial imbalances, such as an overheating or a contraction, can be observed in current financial activities.

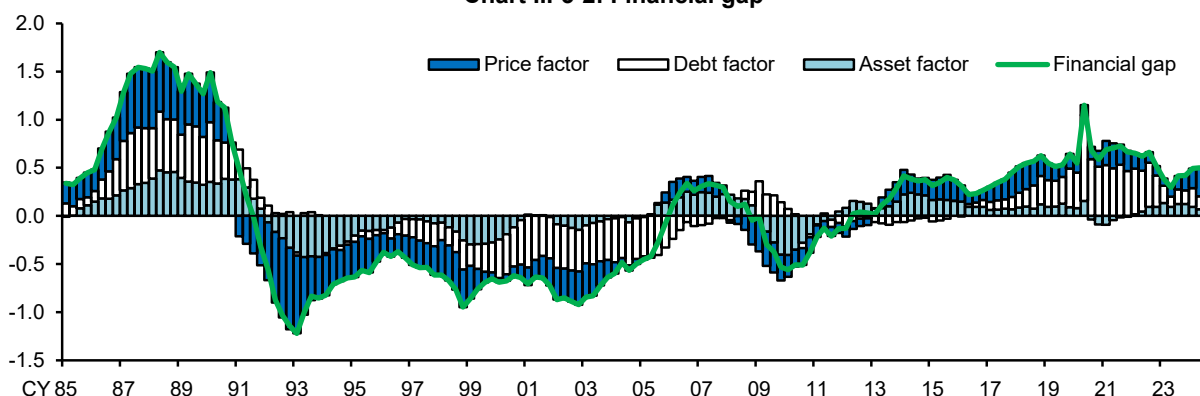
Chart III-3-1: Heat map



Note: The latest data for "Stock prices," "Stock purchases on margin to sales on margin ratio," and "DI of lending attitudes of financial institutions" are as of the July-September quarter of 2024. Those for "Land prices to GDP ratio" are as of the January-March quarter of 2024. Those for the other indexes are as of the April-June quarter of 2024.

Source: Bloomberg; Cabinet Office; Japan Real Estate Institute; Ministry of Finance; Tokyo Stock Exchange; BOJ.

Chart III-3-2: Financial gap



Note: "Asset factor" consists of indexes of fixed investment by the private sector, households, firms, and real estate businesses. "Debt factor" consists of indexes of their debt financing. "Price factor" consists of the remaining indexes. Latest data as of the April-June quarter of 2024 (the land prices to GDP ratio is imputed by the previous period's value).

Source: BOJ.

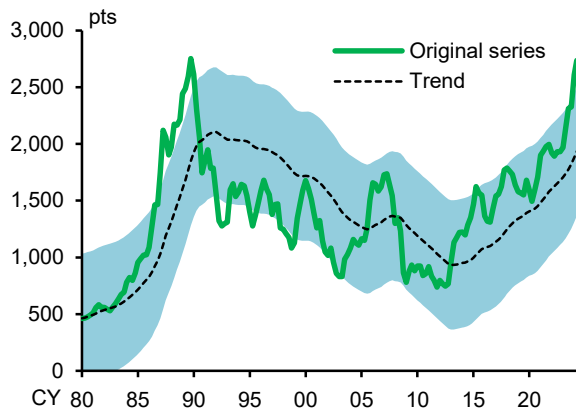
However, in asset markets, prices of assets have risen. In the real estate market, valuations of some properties seem relatively high (as will be described later). As for the stock market, *stock prices*, *stock purchases on margin to sales on margin ratio*, and *equity weighting in institutional investors' portfolios* in the heat map are "red," and the contribution of asset prices such as stock prices (included in "price factor" in Chart III-3-2) to the positive financial gap has been increasing (Charts III-3-1, III-3-2, and III-3-3). At the start of August 2024, the effects of the rapid deterioration in market sentiment in global financial markets spread to the domestic financial market, causing stock prices to fall and market volatility to rise temporarily. However, stock prices subsequently

<sup>16</sup> In Chart III-3-2, which shows the financial gap, larger weights are assigned to indexes that have a higher correlation with other indexes in calculating the weighted average of individual FAIXs. The weights vary based on changes in the degree of correlation over time.



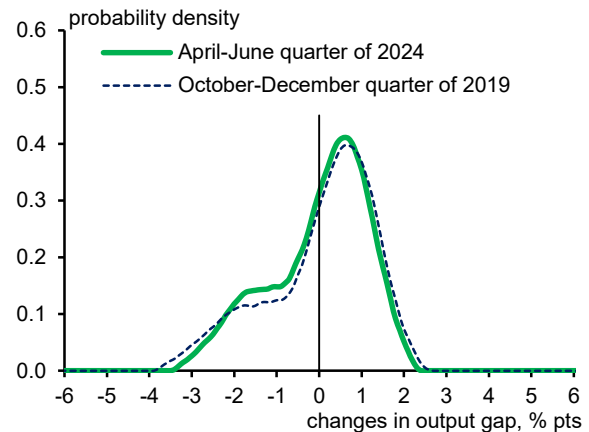
recovered and have been above the level marked at the end of 2023. Meanwhile, price-earnings (P/E) ratios have remained at their historical average and in terms of stock valuations there is no significant overheating. That said, attention continues to be warranted over the possibility of substantial fluctuations in asset prices as a result of a major correction in market participants' views regarding future developments and an unwinding of their investment positions (see Chapter II and Box 1 for fluctuations in financial and foreign exchange markets at the beginning of August 2024).<sup>17</sup>

Chart III-3-3: Stock prices



Note: 1. "Trend" is calculated using the one-sided HP filter.  
The shaded area indicates 1.5 times the root mean square of the deviation from the trend.  
2. Latest data as of the July-September quarter of 2024.  
Source: Bloomberg.

Chart III-3-4: Risks to future economic growth



Note: Shows the changes in output gap over the next 3 years. Estimated based on output gap, financial gap, and U.S. NFCI for each time point.

In addition, from a somewhat long-term perspective, the expansionary phase of the financial gap, which started in the early 2010s, has been continuing. In particular, the "debt factor," which shows the buildup of private debt, has continued to contribute to the positive financial gap, and this buildup could result in balance sheet adjustment pressures and increase the tail risk of an economic downturn. Looking at the probability distribution of future GDP growth rates over the next three years using "GDP-at-risk" (GaR) shows that the distribution remains skewed to the left, toward an economic downturn, almost to the same extent as before the pandemic (Chart III-3-4).<sup>18</sup> As credit continues to increase, whether developments in financial activity will deviate significantly from developments in real economic activity continues to warrant attention.

<sup>17</sup> An analysis using data from 17 countries, including the G7 countries, on the degree to which an index in a heatmap turning "red" predicts a future banking crisis showed that while *stock prices* on their own did not have high predictive power, their predictive power tended to rise when they signaled "red" at the same time as *total credit to GDP ratio*. For details, see Box 1 in the April 2021 issue of the *Report*.

<sup>18</sup> GaR applies the value-at-risk (VaR) approach, a method for assessing the risk associated with financial assets, to the GDP growth rate. Specifically, the regression equation used to estimate GaR here is as follows:

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

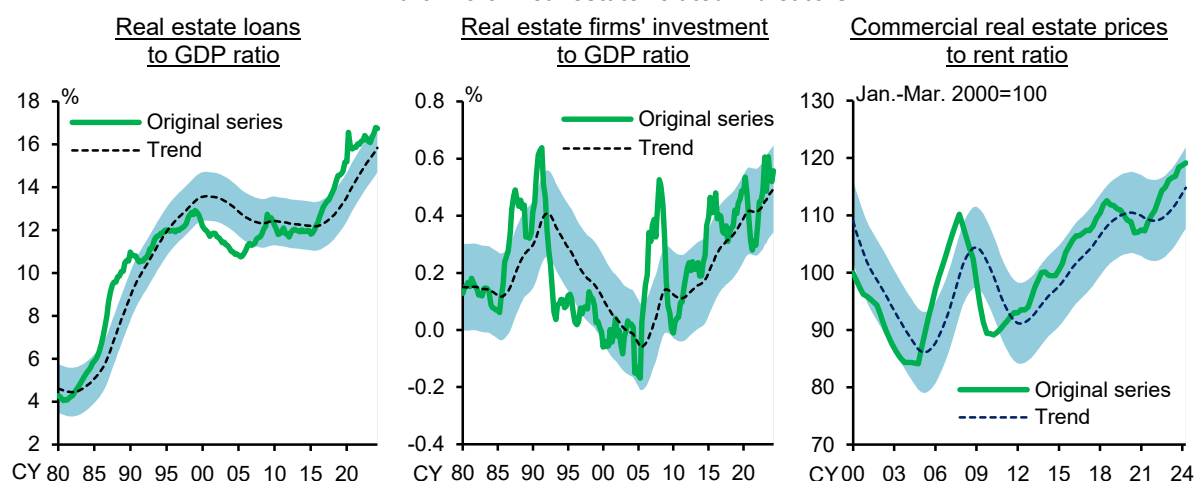
For details on the GaR approach, including the underlying rationale, estimation method, and caveats regarding its use, see Section B of Chapter IV and Box 1 of the October 2018 issue of the *Report*.

## 2. The financial cycle and real estate-related markets

### *Risks and vulnerabilities surrounding the real estate market*

The two real estate-related FAIXs in the heat map, *real estate loans to GDP ratio* and *real estate firms' investment to GDP ratio*, have both been at high levels, exceeding those in the so-called real estate mini-bubble period in the mid-2000s, and, although signaling "green" for now, are close to turning "red" (Chart III-3-5). In terms of prices, the commercial real estate prices to rent ratio in Japan as a whole has been above the level seen in the mini-bubble period.<sup>19</sup>

**Chart III-3-5: Real estate-related indicators**



Note: 1. In the left-hand and middle charts, "Trend" is calculated using the one-sided HP filter. In the right-hand chart, "Trend" is calculated using 3-year backward moving averages. The shaded areas indicate the root mean square of the deviation from the trend.

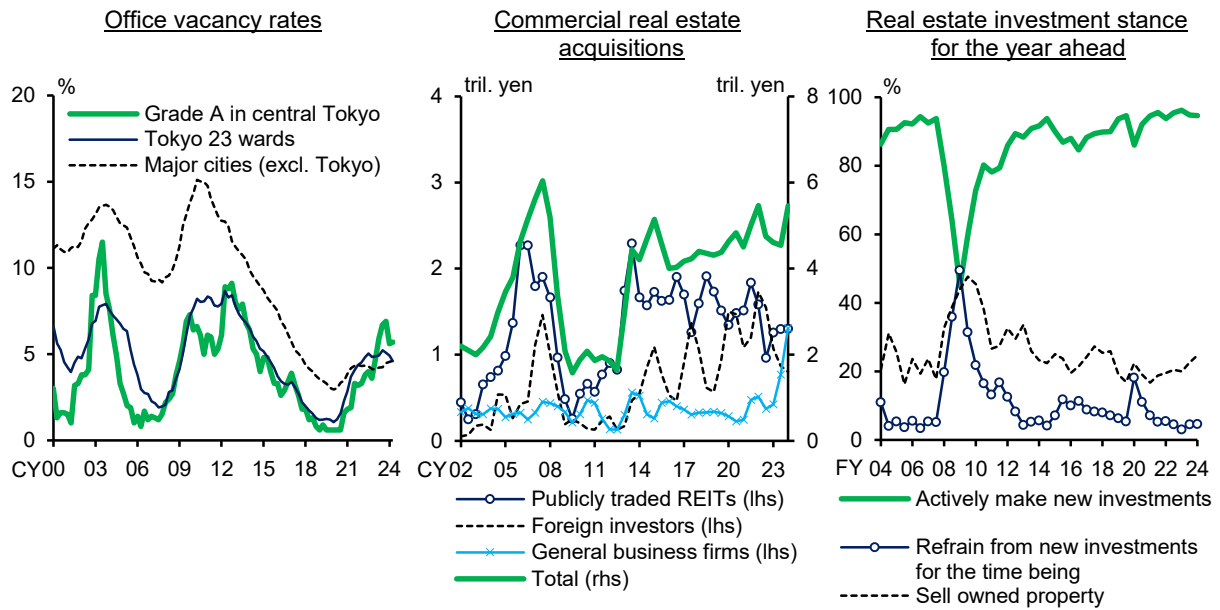
2. Latest data as of the April-June quarter of 2024.

Source: Cabinet Office; Ministry of Finance; Ministry of Land, Infrastructure, Transport and Tourism; BOJ.

Looking at the transaction environment of the commercial real estate market, vacancy rates for office buildings in Tokyo, after rising following the outbreak of the pandemic, mainly due to the large supply of office buildings, have recently begun to decline (Chart III-3-6). Commercial real estate transactions have become more active, reflecting expectations for rent rises as the economy recovers, and transaction volume has remained at high levels. By type of investor, demand from foreign investors, who had been active in acquiring real estate in Japan, has declined somewhat. However, on the back of improved business performance, a wide range of other investors have been making real estate acquisitions, including general business firms, which have been making business fixed investment for manufacturing and logistic facilities with a view to restructuring supply chains. In this situation, most real estate market participants have indicated that they intend to continue actively pursuing new investment.

In addition to this improvement in the transaction environment, real estate transaction prices have been rising nationwide in Japan, reflecting higher land purchasing costs and construction costs (left panel of Chart III-3-7). Looking at the pace of increase in prices by region, the pace differs somewhat between the five central wards of Tokyo and other regions, and the difference has been increasing. In the five central wards of Tokyo, transactions in higher price ranges have been increasing amid the overall trend of rising prices in both commercial and residential land (middle and right panels of Chart III-3-7).

<sup>19</sup> The FAIXs, such as *land prices to GDP ratio*, are designed so that they signal "red" for the bubble period in the late 1980s (Chart III-3-1). In contrast, for the commercial real estate prices to rent ratio in Chart III-3-5, the trend and threshold are set so that the ratio signals "red" for the so-called mini-bubble period in 2007.

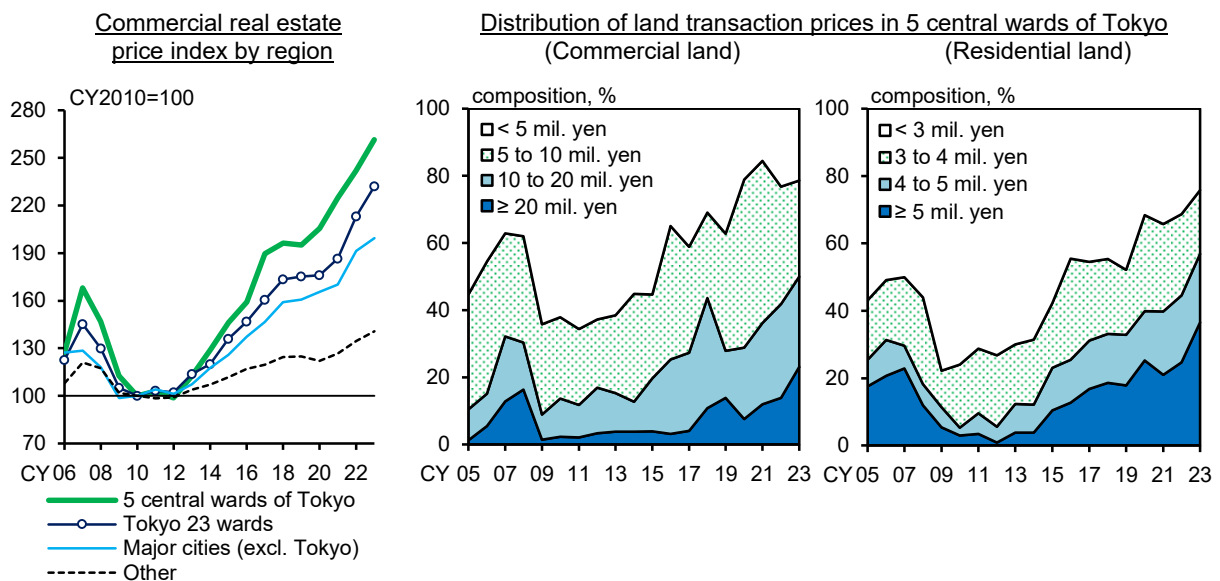
**Chart III-3-6: Supply-demand conditions and transactions in the real estate markets**

Note: 1. In the left-hand chart, vacancy rates are based on office floor space. "Major cities (excl. Tokyo)" indicates the average rates of major cities (Fukuoka, Nagoya, Osaka, Sapporo, and Sendai). Latest data as of the April-June quarter of 2024.

2. The middle chart shows sums for the past one year. Latest data as of the first half of 2024.

3. The right-hand chart indicates the proportion of real estate investors (asset managers, banks, developers, etc.) who selected each given choice (including multiple answers). Latest data are based on the April 2024 survey.

Source: Japan Real Estate Institute; Sanko Estate Co., Ltd.

**Chart III-3-7: Real estate transaction prices**

Note: 1. Based on individual transaction data of "Real Estate Transaction-price Information." The left-hand chart indicates quality-adjusted prices estimated using the Hedonic approach for each region, and the middle and right-hand charts indicate the composition of transaction prices per unit of land.

2. "5 central wards of Tokyo" indicates Chiyoda, Chuo, Minato, Shibuya, and Shinjuku wards.

3. In the left-hand chart, "Major cities (excl. Tokyo)" is estimated based on data of Fukuoka, Hiroshima, Nagoya, Osaka, Sapporo, and Sendai. "Other" is estimated based on data excluding the 6 cities above and Tokyo 23 wards.

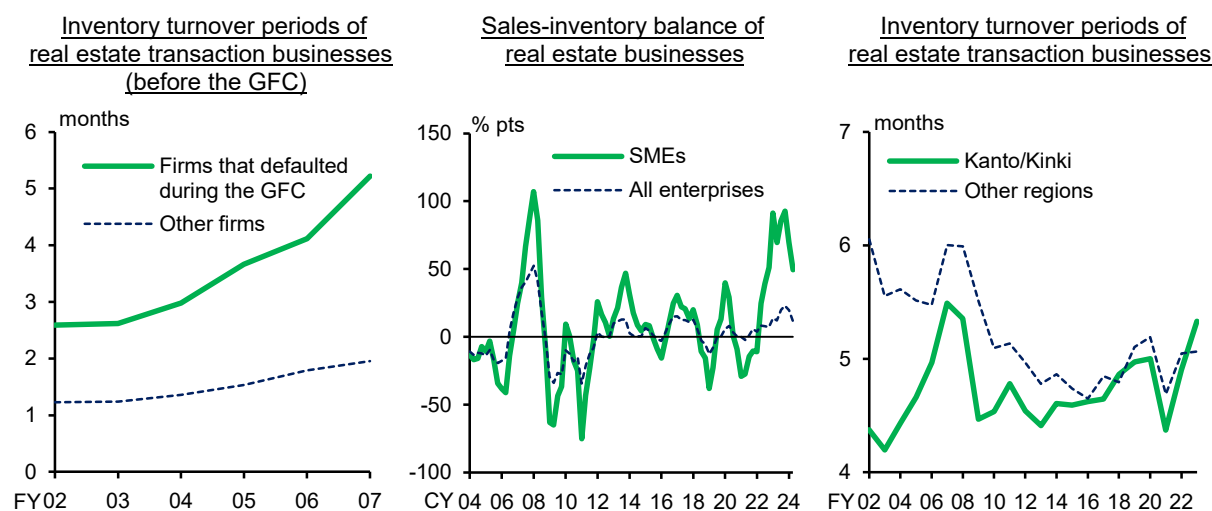
4. Latest data as of 2023.

Source: Ministry of Land, Infrastructure, Transport and Tourism.

During the mini-bubble period, as transactions in higher price ranges increased, defaults especially among small and medium-sized real estate transaction businesses that had built up large inventories increased (Chart III-3-8). Against this background, looking at the inventory cycle in the real estate sector shows that inventories relative to sales have been elevated in recent years,

especially among small and medium-sized enterprises (SMEs). Although inventories have increased in tandem with sales increase, there are scattered observations of delays in construction projects amid rising construction costs. Therefore, rising inventory levels close to those seen during the mini-bubble period warrant close attention, especially among real estate transaction businesses in major urban areas such as the Kanto and Kinki regions.

**Chart III-3-8: Investments and inventories of real estate businesses**



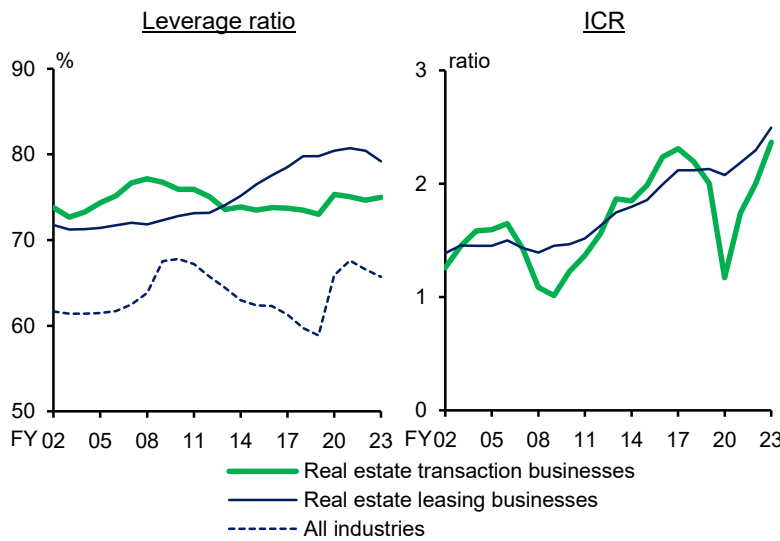
Note: 1. The left- and right-hand charts cover SMEs in real estate transaction businesses for land, offices, and used houses. "Firms that defaulted during the GFC" indicates firms that defaulted from fiscal 2008 to 2010. Inventory turnover period is the ratio of inventory assets to sales. The charts show the median of each firm group and region. Latest data for the right-hand chart are as of fiscal 2023.  
2. In the middle chart, sales-inventory balance is calculated as year-on-year rates of change in inventory assets minus those in sales. 4-quarter backward moving averages. Latest data as of the April-June quarter of 2024.

Source: CRD association; Ministry of Finance.

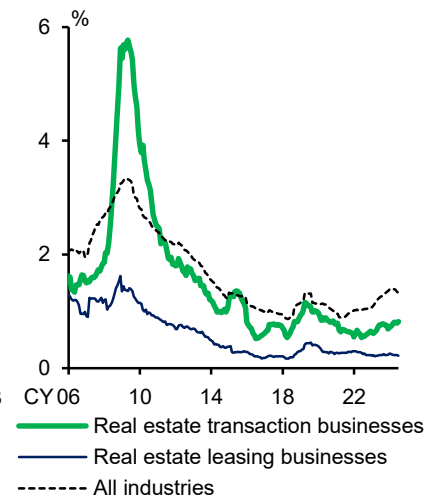
Turning to real estate businesses' financial conditions, although leverage ratios have recently been rising slightly among real estate transaction businesses, the interest coverage ratios (ICRs) of these businesses, which represent their interest payment capacity, have been rising with the economic recovery and are high compared with the mini-bubble period (Chart III-3-9).<sup>20</sup> Under these circumstances, default rates have remained stable at low levels (Chart III-3-10). However, leverage ratios in the real estate sector are higher and businesses in this sector are more sensitive to interest rate changes than those in other sectors. Moreover, foreign funds have continued to sell investment properties in Japan as part of their portfolio rebalancing. As stated in the previous *Report*, even when the shock of a substantial repricing of commercial real estate in metropolitan areas is assumed, banks' economic losses are limited on a macro basis; however, real estate-related lending and investment has been on an increasing trend.<sup>21</sup> Given the developments described, it is necessary to pay even more attention to the outlook for the real estate market, including whether there will be any changes in market conditions.

<sup>20</sup> Profits of real estate leasing businesses have been stable and less susceptible to economic fluctuations, as can be seen by developments in their ICRs. However, attention needs to be paid to the fact that real estate leasing businesses' leverage ratios have been above those of real estate transaction businesses recently and to the risk that changes in demographics and the competitive environment in the medium to long term suppress their profits. For details, see Box 2 in the October 2021 issue and the April 2022 issue of the *Report*.

<sup>21</sup> For details, see the previous issue of the *Report*, which presents stress testing assuming a repricing of commercial real estate in some limited metropolitan areas triggered by a correction in foreign real estate markets to simulate banks' economic losses (credit costs as well as valuation and realized losses on securities) in Japan. While foreign commercial real estate markets continue to show signs of correction, as can be seen in weakening supply and demand conditions for office buildings, the exposure of Japanese banks to these markets is limited (see Section A of Chapter IV).

**Chart III-3-9: Financial conditions of real estate businesses**

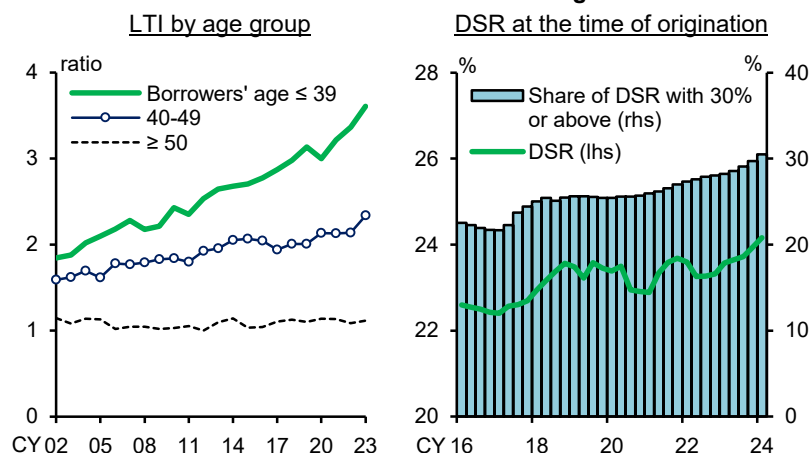
Note: 1. Leverage ratio is the ratio of interest-bearing debt to total assets.  
ICR is the ratio of the sum of operating profits and interest income to interest payments.  
2. Covers SMEs. Shows the median of each business.  
Source: CRD association.

**Chart III-3-10: Default rates of real estate businesses**

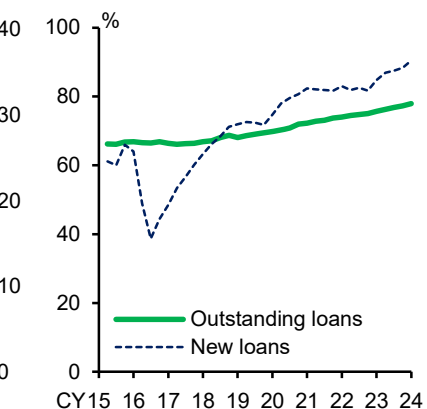
Note: Default is based on the classification "in danger of bankruptcy."  
Latest data as of July 2024.  
Source: The Risk Data Bank of Japan.

### Risks surrounding housing loans and their vulnerability

The outstanding amount of housing loans, which account for the largest part of household debt, has continued to increase (Chart III-1-9). A closer look shows that, with property prices rising, the loan-to-income (LTI) ratio -- the ratio of borrowers' loans outstanding to their annual income -- has risen, especially for younger households (Chart III-3-11). Looking at the debt servicing ratio (DSR) -- the ratio of annual repayments to annual income -- the share of housing loans with a DSR of 30 percent or above at the time of origination has risen. Looking at housing loans by type of interest, floating-rate loans continue to account for about 80 percent of housing loans (Chart III-3-12). This and other factors suggest that an increasing number of borrowers of housing loans have a relatively low resilience to a decline in income or a rise in interest rates (see Box 2 for analysis on risk characteristics of housing loans by age and region).

**Chart III-3-11: LTI and DSR of housing loans**

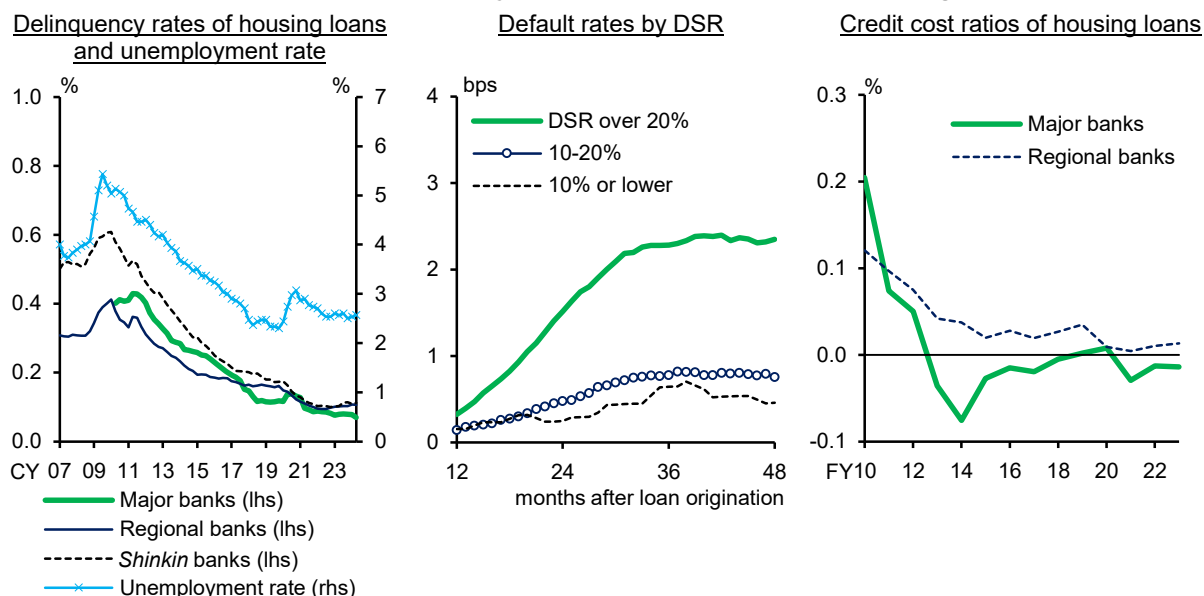
Note: 1. The left-hand chart covers two-or-more-person households with liabilities.  
2. The right-hand chart covers major, regional, and *shinkin* banks. 4-quarter backward moving averages. Latest data as of the January-March quarter of 2024.  
Source: Ministry of Internal Affairs and Communications; BOJ.

**Chart III-3-12: Share of floating-rate housing loans**

Note: Covers major and regional banks.  
The latest data for "Outstanding loans" are as of end-March 2024.  
Those for "New loans" are as of the January-March quarter of 2024.  
Source: BOJ.

Housing loan delinquency rates have been trending downward since the global financial crisis, when employment conditions were under severe stress, and have recently been at historically low levels despite changes in the quality of housing loans (Chart III-3-13). However, the higher the DSR, the more likely borrowers are to default on their housing loans, and the likelihood of default rises substantially in a nonlinear fashion when the DSR exceeds 20 percent. Although housing loans are more risk diversified than loans to firms and have not led to a significant increase in credit costs in Japan, banks need to examine changes in the quality of housing loans.

**Chart III-3-13: Delinquency rates and credit cost ratios of housing loans**



- Note: 1. The left-hand chart shows the share of loans overdue by three months or more by type of bank and unemployment rate. Seasonally-adjusted. The data for major banks are from fiscal 2010. Latest data as of end-June 2024.
2. The middle chart shows the share of the number of prepayment-requested loans among mortgage-backed securities (launched since 2013) of the Japan Housing Finance Agency. Shows the default rates by DSR at the time of housing loan origination. 12-month backward moving averages.
3. In the right-hand chart, credit cost ratio is the ratio of the sum of credit costs on a non-consolidated basis and those of affiliated guarantee companies to the sum of outstanding amount of housing loans without guarantees and those with affiliated companies' guarantees. Latest data as of fiscal 2023.

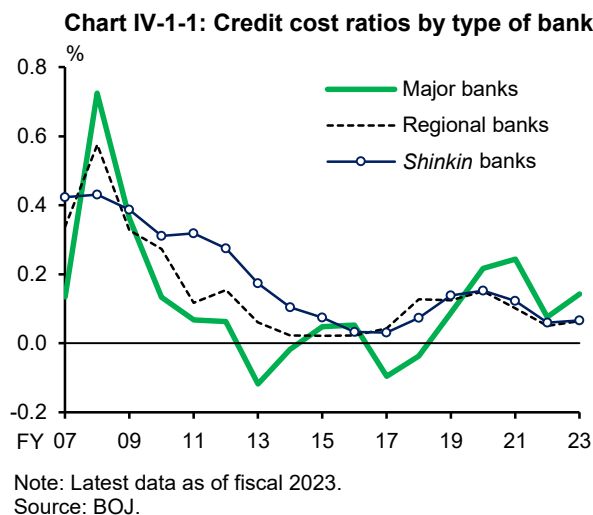
Source: Japan Housing Finance Agency; Ministry of Internal Affairs and Communications; BOJ.

## IV. Risks faced by financial institutions

- The quality of banks' domestic and foreign loan portfolios has been maintained. Although corporate profits in Japan have been on a recovery trend on the whole and credit costs have been limited, bankruptcies have been increasing, particularly among firms whose business conditions had already been unfavorable and small-sized firms whose profits have been improving only at a slow pace due to the rise in raw material costs and other factors. With regard to foreign loans, the past rise in funding costs has exerted stress on firms' financial conditions and banks have continued to be selective in their lending stance.
- Banks have been rebalancing their securities portfolios, and the duration of their yen-denominated bondholdings has been getting shorter. Reflecting this rebalancing, banks' resilience to rising yen interest rates has been increasing. From a somewhat longer-term perspective, rising yen interest rates will likely improve banks' interest income balances overall, including through changes in loan and deposit rates. However, there is some uncertainty regarding the impact on banks' profits, since the pass-through of interest rate rises to loan and deposit rates depends on supply and demand balance and the competitive environment in the loan and deposit markets, on banks' capacity to provide financial services, and on banks' relationships with customers. Given this, banks need to continue to adequately manage their interest rate and duration risks.
- Banks have sufficient yen funding liquidity, which mainly consists of small retail deposits. As for foreign currency, they have maintained stable funding by using a combination of medium- and long-term market funding and the acquisition of sticky corporate deposits. It should be noted that there is uncertainty over the future funding environment. Banks need to continue to work toward establishing stable funding bases.
- In addition to these risks, banks need to continue to properly manage risks related to digital technologies and climate-related financial risks.

### A. Credit risk

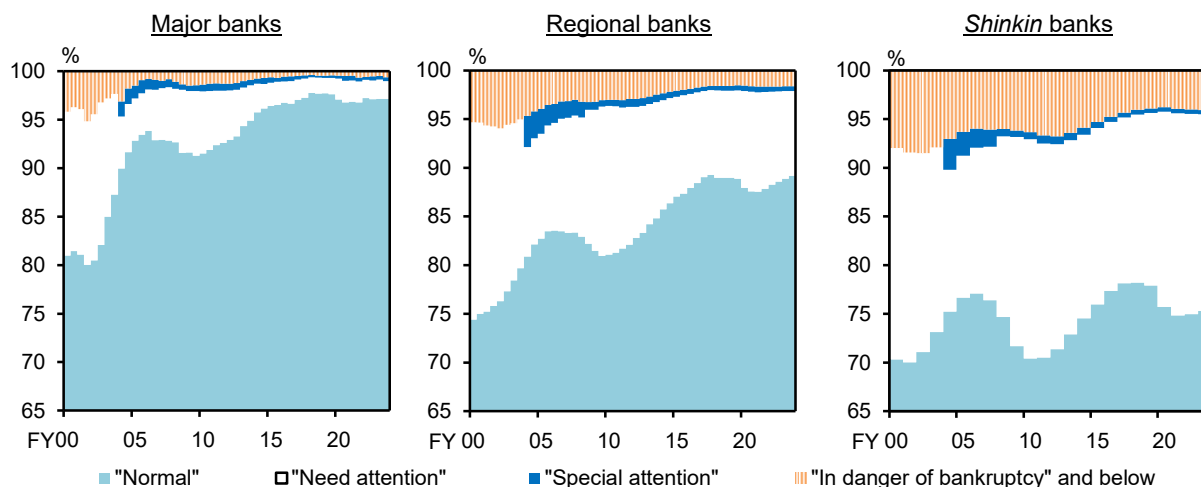
Banks' credit cost ratios have remained low (Chart IV-1-1). Looking at loans by borrower classification, the shares of "normal" loans have stayed high, and the shares of borrowers classified as "in danger of bankruptcy" and below have remained at historically low levels (Chart IV-1-2).





IV. Risks faced by financial institutions  
A. Credit risk

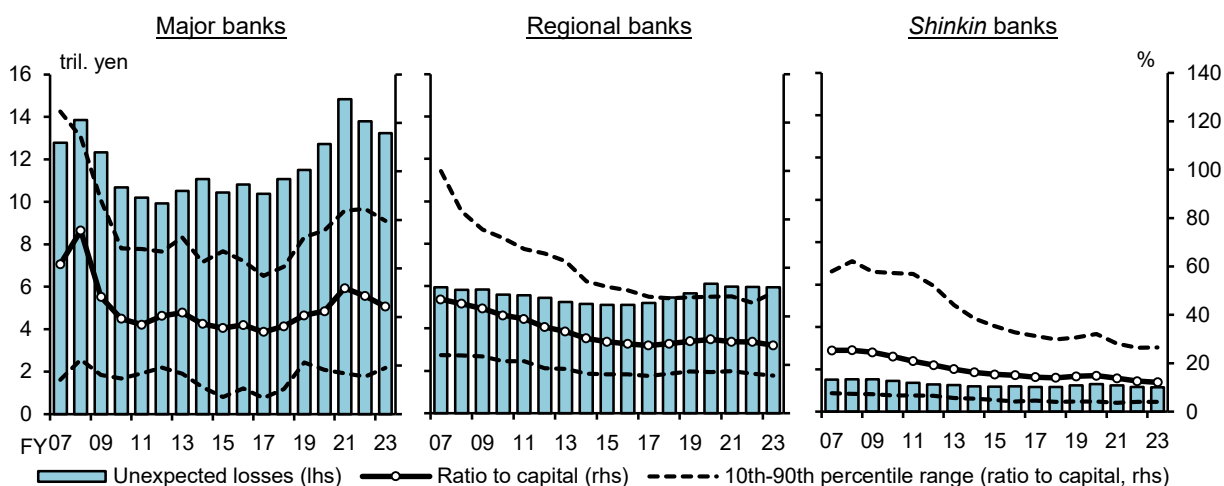
Chart IV-1-2: Composition of loans by borrower classification



Note: "Need attention" indicates "Need attention excluding special attention" from fiscal 2004. Latest data as of end-March 2024.  
Source: BOJ.

There has been no marked change in estimates of unexpected losses since the previous issue of the *Report* (Chart IV-1-3).<sup>22</sup> While loss levels have remained somewhat elevated for major banks, the ratios of unexpected losses to capital stand at around 40 percent for major banks, 30 percent for regional banks, and 10 percent for *shinkin* banks. The quality of banks' domestic and foreign loan portfolios has been maintained.

Chart IV-1-3: Unexpected losses by type of bank



Note: Unexpected losses are the difference between the maximum amount of losses with a 99 percent confidence level and expected losses. "Ratio to capital" is calculated using CET1 capital for internationally active banks from fiscal 2012 onward, core capital for domestic banks from fiscal 2013 onward, and Tier 1 capital for all others (excl. the transitional arrangements). The charts cover credit that is subject to self-assessment. Latest data as of fiscal 2023.

Source: BOJ.

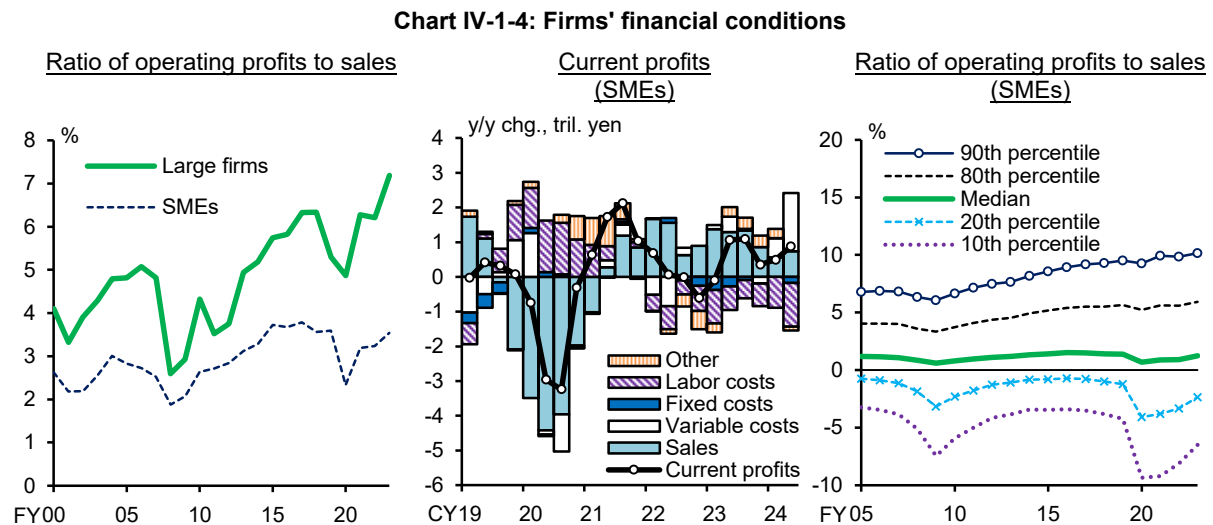
<sup>22</sup> Unexpected losses in Chart IV-1-3 are defined as the difference between the maximum amount of losses on loans that could occur with a confidence level of 99 percent within a year and the amount of losses that occur on average in a year (expected losses). The calculation is based on the actual default rate from fiscal 2005 to each point in time. The loss given default is assumed to be equal to the average ratio of unsecured loans to borrowers that need "special attention" or are "in danger of bankruptcy."



## 1. Domestic credit risk

### Developments in corporate bankruptcies

Amid the continuing moderate economic recovery, corporate profits in Japan have been improving on the whole (Chart IV-1-4). However, compared to large firms, the pace of increase in corporate profits of small and medium-sized enterprises (SMEs) -- despite a recovery in sales -- has been slow, partly due to past rises in raw material costs and labor costs. In addition, the distribution of SMEs' ratio of operating profits to sales shows that there are a considerable number of firms whose pace of improvement in corporate profits has been slower than that of SMEs overall and whose operating profits have been negative. As a result, the skew of the distribution to the downside seen since the pandemic has remained.



Note: 1. Data for the right-hand chart are based on the CRD, and the rest are based on the Financial Statements Statistics of Corporations by Industry.

2. The latest data for the middle chart are as of the April-June quarter of 2024, and those for the left- and right-hand charts are as of fiscal 2023. The data for the middle chart are 2-quarter backward moving averages.

Source: CRD Association; Ministry of Finance.

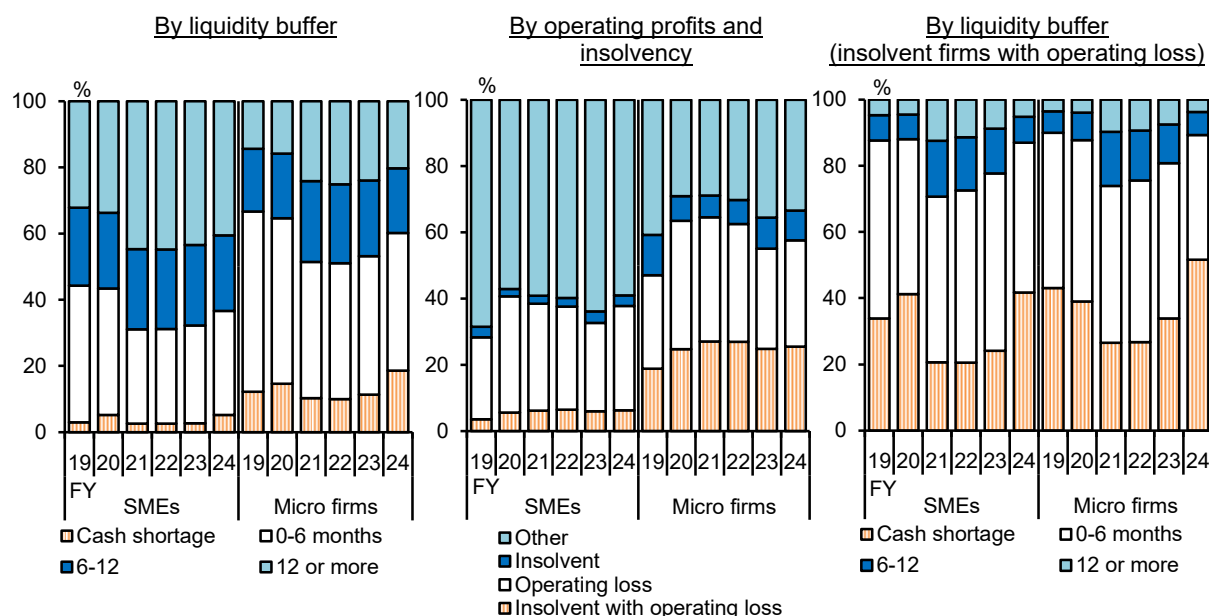
The distribution of firms' financial conditions suggests that firms that have secured ample cash reserves (the sum of on-hand liquidity<sup>23</sup> at the beginning of each fiscal year and net operating cash flow during the year) continue to be in the majority, due in part to the various measures to support corporate financing since the pandemic (Chart IV-1-5). However, most recently there have been signs of an increase in the share of SMEs and micro firms with low liquidity buffers.<sup>24</sup> Looking at firms' operating profits and debt shows that, although the share of firms that are both making operating losses and are insolvent overall is limited, it rose during the pandemic and remains elevated. Among firms that are both making operating losses and are insolvent, the rise in the share of those with a low liquidity buffer has been more pronounced.

<sup>23</sup> Among liquid assets, on-hand liquidity is defined as the sum of cash, deposits, and short-term securities.

<sup>24</sup> Unless otherwise noted, the analysis in Chart IV-1-5 and the subsequent charts cover firms contained in the CRD Association's Credit Risk Database for SMEs. The ratio of the number of SMEs (firms with sales of 100 million yen or more) to micro firms (firms with sales of less than 100 million yen) is roughly 1:1. Figures for fiscal 2024 in Chart IV-1-5 are estimates based on profit forecasts in the *Tankan*.

IV. Risks faced by financial institutions  
A. Credit risk

**Chart IV-1-5: Composition of firms by financial characteristic**



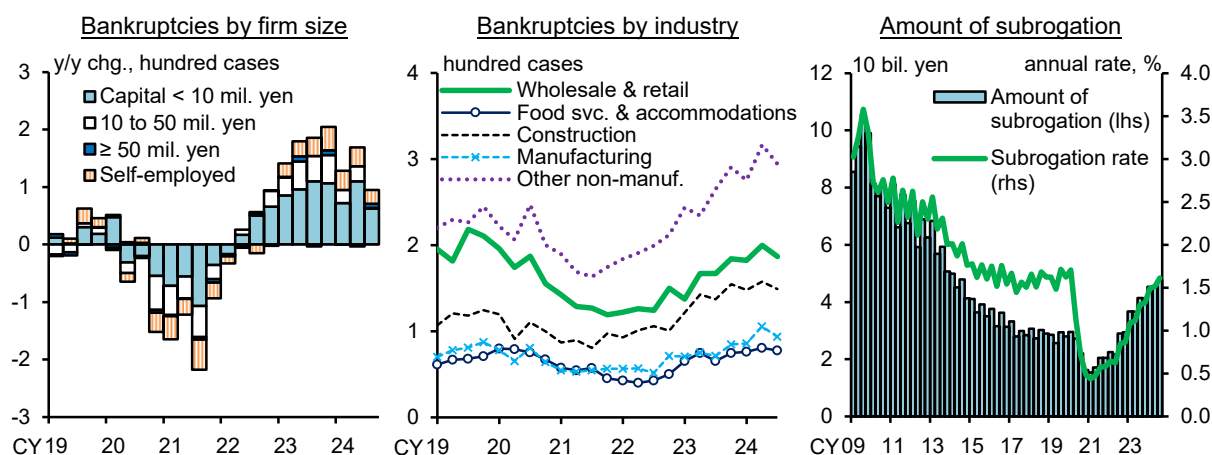
Note: 1. Liquidity buffer is calculated as the ratio of cash reserves (the sum of cash, deposits, and short-term securities at the beginning of each year and net operating cash flow during the year) to monthly average administrative expenses. The data for fiscal 2024 are estimated based on data as of July 2024.

2. SMEs are firms with capital of 100 million yen or less and sales of 100 million yen or more. Micro firms are firms with capital of 100 million yen or less and sales of less than 100 million yen.

Source: CRD Association; BOJ.

Against this background, corporate bankruptcies and defaults have been increasing since the second half of 2022, particularly among small-sized firms (Chart IV-1-6). By industry, firms in the non-manufacturing sector, including the wholesale and retail industry, account for a large share of firms that have gone bankrupt or have defaulted. Amid the increase in corporate bankruptcies and defaults, particularly among micro firms, credit guarantee corporations' subrogation has recently been rising. In particular, the rise in the default rate of firms with relatively little cash reserves and firms that are both making operating losses and are insolvent has been more pronounced, exceeding the rate marked before the pandemic (Chart IV-1-7). Grouping firms based on their financial condition before the pandemic (as of fiscal 2018) suggests that firms that were already vulnerable with respect to cash reserves, operating profits, and/or insolvency have contributed

**Chart IV-1-6: Number of corporate bankruptcies and subrogation**



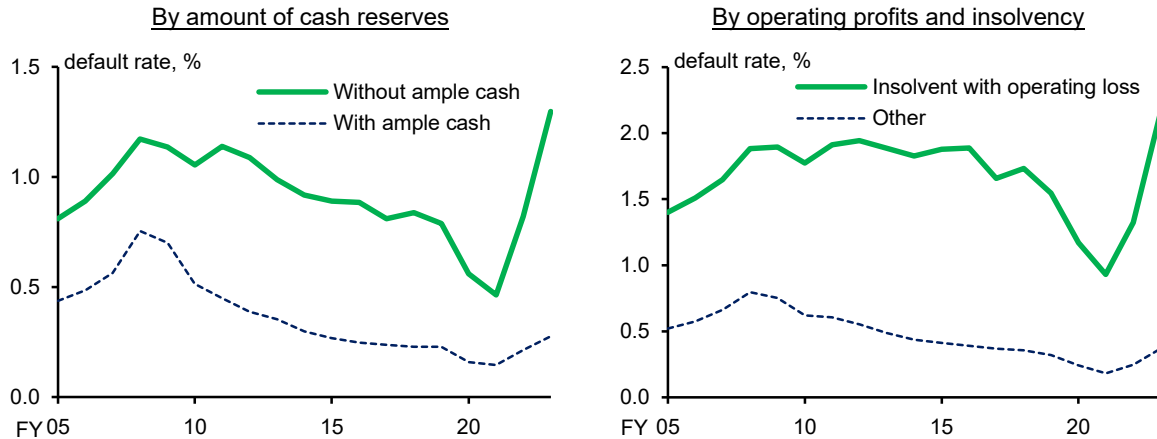
Note: 1. The data for "Subrogation rate" in the right-hand chart are based on staff calculations and are annualized values. The rest are quarterly averages of the monthly data.

2. Latest data for the left-hand and middle charts are as of the July-September quarter of 2024, and those for the right-hand chart are as of July-August 2024.

Source: Japan Federation of Credit Guarantee Corporations; Teikoku Databank.

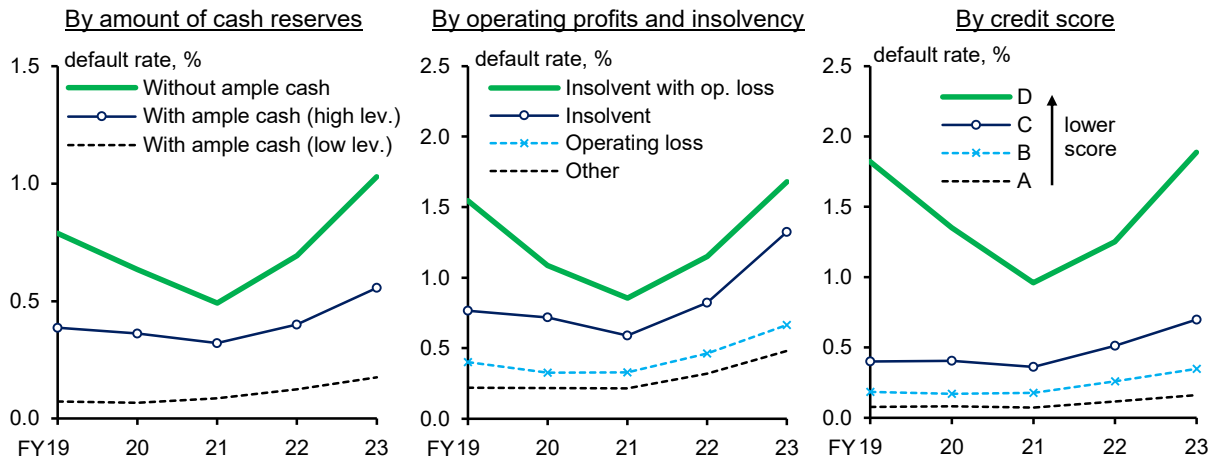
considerably to the recent rise in actual default rates (Chart IV-1-8). In addition, the default rate of firms that were not highly vulnerable before the pandemic has also been rising somewhat, indicating that firms with high leverage ratios despite having ample cash reserves before the pandemic, and firms running out of cash reserves and/or that have experienced a deterioration in their business due to changes in economic conditions since the pandemic, have contributed to the higher default rate.

**Chart IV-1-7: Default rates by firm's financial characteristic**



Note: 1. Default rates are calculated based on the annual number of defaults (downgrades to "de facto bankrupt" or below for the first time). Covers SMEs and micro firms (firms with capital of 100 million yen or less). Latest data as of fiscal 2023.  
2. In the left-hand chart, "Without ample cash" indicates firms with cash reserves of less than half of their annual administrative expenses, and "With ample cash" indicates firms with cash reserves of half or more of those expenses.  
Source: CRD Association.

**Chart IV-1-8: Default rates by pre-pandemic firm characteristic**



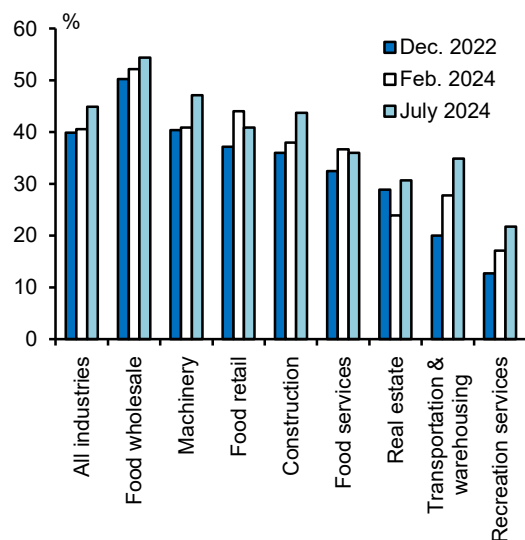
Note: 1. Default rates are calculated based on the annual number of defaults (downgrades to "de facto bankrupt" or below for the first time). Covers SMEs and micro firms (firms with capital of 100 million yen or less) with repeated observations since fiscal 2018. Latest data as of fiscal 2023.  
2. In the left-hand chart, firms with cash reserves of less than half of their annual administrative expenses in fiscal 2018 are grouped as "Without ample cash." Other firms (i.e., "With ample cash") are further divided into two groups based on financial leverage. In the middle chart, firms are grouped based on their financial conditions (i.e., operating loss and insolvency) in fiscal 2018. Credit scores in the right-hand chart are based on quartiles of probability of default (PD) in fiscal 2018 (estimated using the PD model).  
Source: CRD Association.

Despite the increase in corporate bankruptcies and default rates, banks' credit cost ratios have remained at a low level, as stated earlier. Likely reasons are that many of the firms that have gone bankrupt or have defaulted are small, that major and regional banks in particular had built up precautionary loan-loss provisions, and that some loans are covered by credit guarantees.

### Impact of rising raw material and labor costs on firms' financial conditions

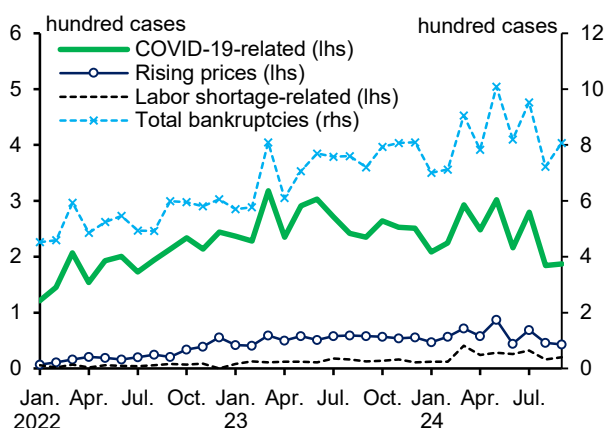
The rise in raw material costs, mainly due to the rise in import prices, and in labor costs in recent years on the whole has been absorbed by increased sales (middle panel of Chart IV-1-4). Moreover, a survey on price pass-through rates by a private firm shows that, most recently, a wider range of firms have engaged in price pass-through, as seen, for example, in higher pass-through rates in downstream industries such as food services and transportation and warehousing (Chart IV-1-9). However, since price pass-through rates and cost structures vary widely by industry, further cost increases may contribute to higher default rates, especially among financially vulnerable firms. As for the reasons for bankruptcies, some have pointed to rising prices and labor shortages as contributing factors (Chart IV-1-10).

**Chart IV-1-9: Price pass-through rates by industry**



Note: Based on a survey on price pass-through by the Teikoku Databank.  
Source: Teikoku Databank.

**Chart IV-1-10: Developments in bankruptcies related to COVID-19, rising prices, and labor shortage**



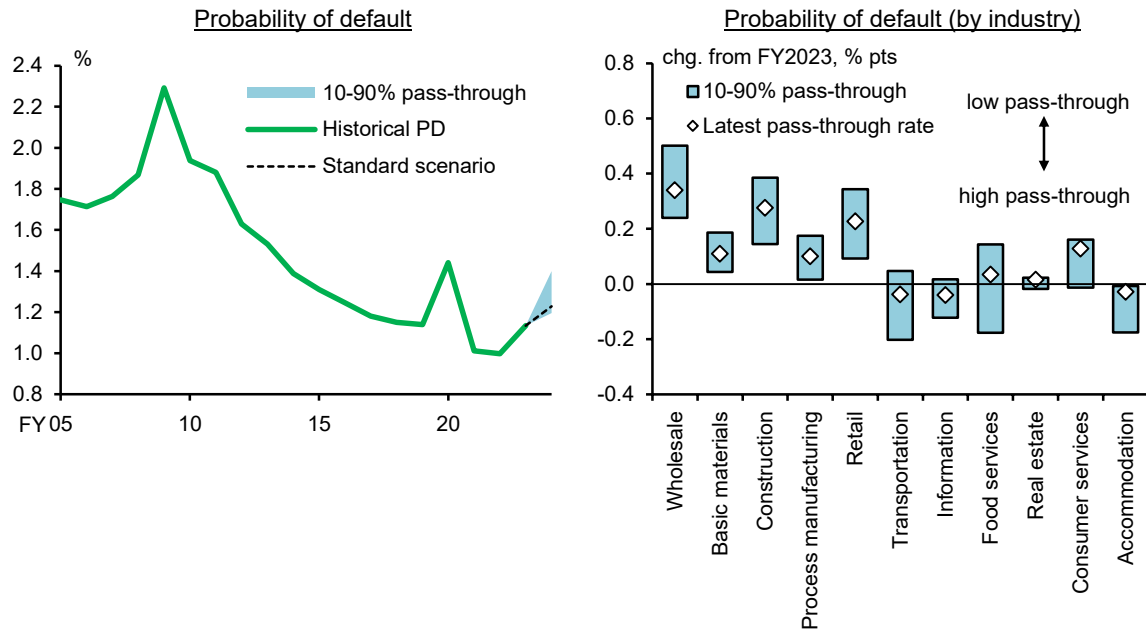
Note: Latest data as of September 2024. Multiple choices were allowed regarding the causes of bankruptcy.  
Source: Tokyo Shoko Research.

In order to assess the impact of higher costs on firms' financial conditions and default rates in the current fiscal year, fiscal 2024, this *Report* provides estimates on the probability of default that incorporate the rise in raw material costs and labor costs as suggested by developments in the diffusion index (DI) for input prices and the DI for employment conditions in the *Tankan* (Short-Term Economic Survey of Enterprises in Japan) (for details on the estimation of the impact of higher raw material and labor costs on firms' financial conditions and probability of default, see Box 3).<sup>25</sup> The results show that the increase in the probability of default is relatively high in industries with high cost-to-sales ratios, such as the wholesale, retail, and construction industries (right panel of Chart IV-1-11). The number of bankruptcies in these industries has also been increasing recently,

<sup>25</sup> The probability of default was estimated using a default model that explicitly takes into account changes in individual firms' on-hand liquidity during the fiscal year. The dependent variable of the model is a dummy variable representing whether a firm defaults over the next year. A default indicates that a firm has met one of the following conditions within one year for the first time: (1) being delinquent for three months or longer, (2) being downgraded to "special attention" or below, or (3) being subject to subrogation by a credit guarantee corporation. Explanatory variables are the short-term cash surplus/shortage ratio (ratio of the sum of on-hand liquidity at the beginning of each year and net operating cash flow during the year to total assets), the financial leverage (borrowings/total assets), the borrowing interest rate, and the kinked ICR. The estimation period is from fiscal 2003 to fiscal 2022 and the estimation covers SMEs. Firms' financial conditions for fiscal 2024 are assumed based on projections for small firms in the same industry for fiscal 2024 in the *Tankan*. When the operating ROA in the numerator is negative, the kinked ICR is defined by multiplying the operating ROA, the borrowing interest rate, and the financial leverage. For details on the probability of default model, see Box 4 of the October 2020 issue of the *Report*.

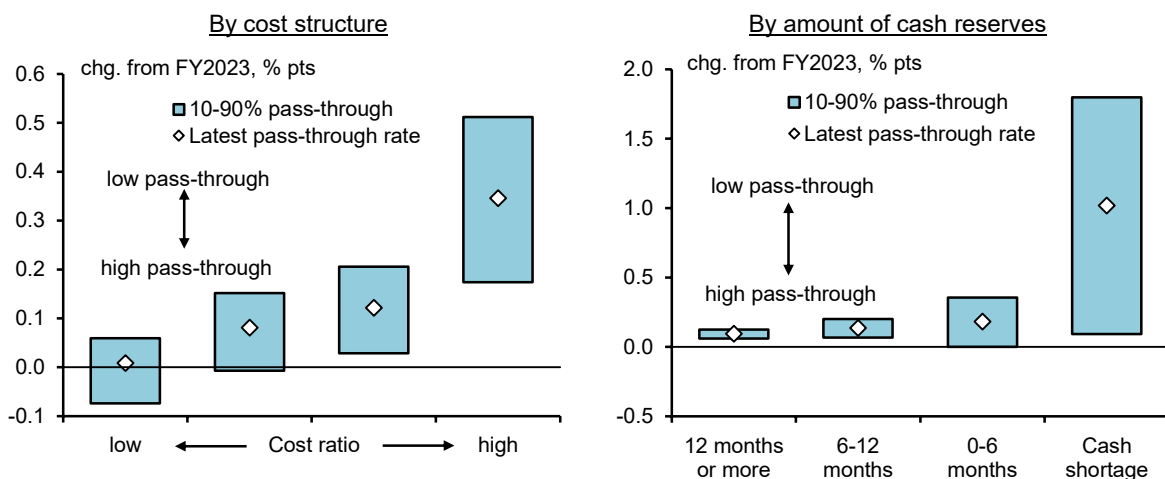
which is consistent with the simulation results (middle panel of Chart IV-1-6). On the other hand, in industries with low cost-to-sales ratios, such as the information and accommodations industries, the positive impact of the economic recovery and progress in passing on price increases may be preventing an increase in the default rate. Moreover, the extent to which the probability of default rises also varies considerably depending on the size of the price pass-through rate. Looking at firms by cost structure and by financial condition shows that in the event of a cost shock the

**Chart IV-1-11: Price pass-through simulation**



Note: 1. Shows the average probability of default (PD) estimated from the PD model. Covers SMEs.  
 2. "Standard scenario" is estimated using the sales and profits forecasts for fiscal 2024 in the *Tankan*. "Latest pass-through rate" refers to data from the July 2024 survey by the Teikoku Databank. The bands show the range in which the PD would change depending on the rate of price pass-through.  
 3. Industries in the right-hand chart are sorted by descending order of their variable and labor costs relative to sales.  
 Source: CRD Association; Ministry of Finance; Teikoku Databank; BOJ.

**Chart IV-1-12: Rise in probability of default by cost structure and financial condition**



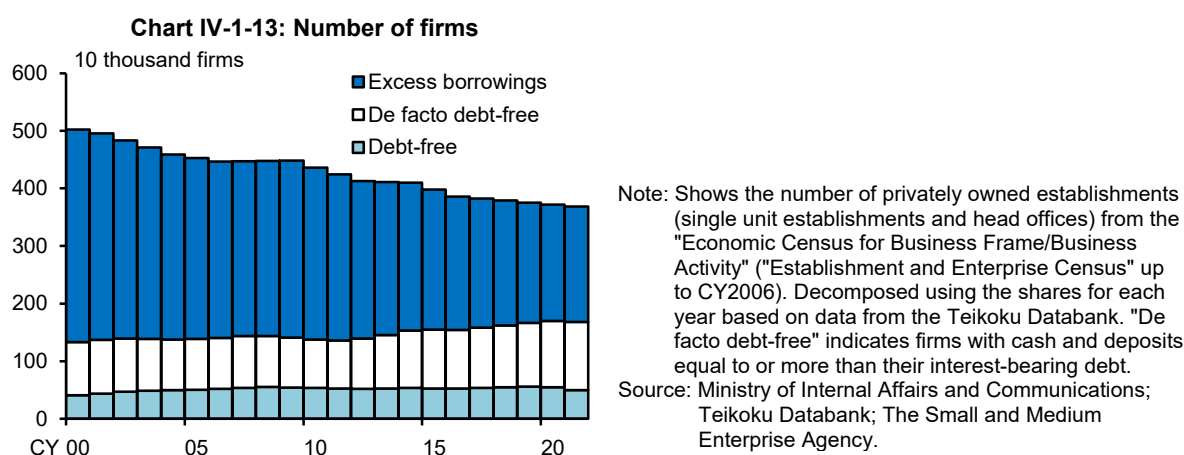
Note: 1. Shows the change in the estimated probability of default from fiscal 2023 to 2024. Values for fiscal 2024 are estimated using forecast data for fiscal 2024 in the *Tankan*. Covers SMEs.  
 2. "Latest pass-through rate" refers to data from the July 2024 survey by the Teikoku Databank. The bands show the range in which the PD would change depending on the rate of price pass-through.  
 3. Groups in the left-hand chart are based on quartiles of firms' variable and labor costs relative to their sales for fiscal 2023, and those in the right-hand chart are based on the ratio of cash reserves to monthly average administrative expenses for fiscal 2023.  
 Source: CRD Association; Ministry of Finance; Teikoku Databank; BOJ.

probability of default increases nonlinearly for firms with larger variable and labor costs relative to their sales and for firms without ample cash reserves (Chart IV-1-12). These simulation results suggest that -- in addition to the cost shocks themselves -- the recent increase in the default rate may be due to the combined effects of these shocks and existing weaknesses in firms' financial conditions. While it is unlikely that the credit cost ratio overall will increase substantially, with the price pass-through gradually spreading, future developments warrant careful attention, not only with regard to firms with already unfavorable business conditions, but also with regard to firms with high costs relative to sales.

Given the heterogeneity in the pace of improvement in corporate profits, banks need to accelerate their support for borrowers' core business to improve or revitalize the business of these firms taking into account their business conditions. In doing so, banks' measures ought to include not only support for firms' financing required during the pandemic but also support for existing firms to start new core businesses and support for business closures and business takeovers.<sup>26</sup> From the perspective of preventing a deterioration in firms' business, it is also important that, in addition to conducting forward-looking management, banks maintain strong relationships with business partners and make business-related proposals in cooperation with external related organizations as necessary. Moreover, to provide continued support to firms, it is also important that banks have sufficient provisions.

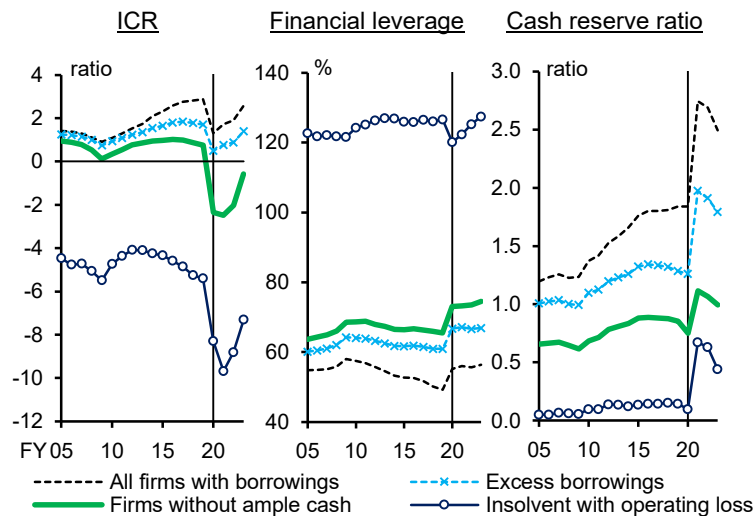
### *Impact of changes in interest expenses on firms' financial conditions*

Looking at firms as a whole, there has been an increase in recent years in the number of firms that are either debt-free or de facto debt-free, while the number of firms with borrowings exceeding cash and deposits has decreased (Chart IV-1-13). Moreover, looking at firms with borrowings exceeding cash and deposits overall, their interest coverage ratios (ICRs), which represent their interest payment capacity, have increased and their leverage ratios have remained more or less unchanged as the economy has improved and firms have repaid loans guaranteed by credit guarantee corporations taken out during the pandemic (Chart IV-1-14). A look at the composition of borrowings shows that the terms of corporate loans are becoming longer and more loans are at fixed interest rates (Chart IV-1-15). This suggests that the corporate sector as a whole or firms with borrowings exceeding cash and deposits as a whole are becoming more resilient to rising interest rates.

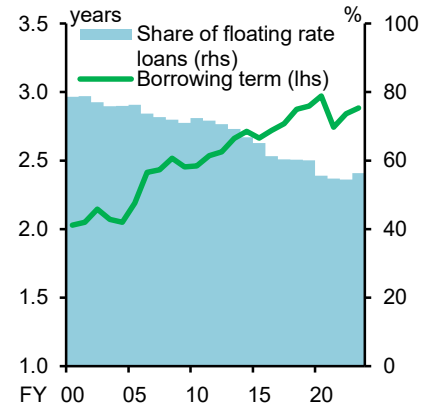


<sup>26</sup> In March 2024, the Ministry of Economy, Trade and Industry, the Financial Services Agency, and the Ministry of Finance formulated a document on comprehensive measures to support business revitalization, requesting privately-owned banks to support non-financial firms for the early development of business recovery plans, etc., rather than postponing business improvement and revitalization.



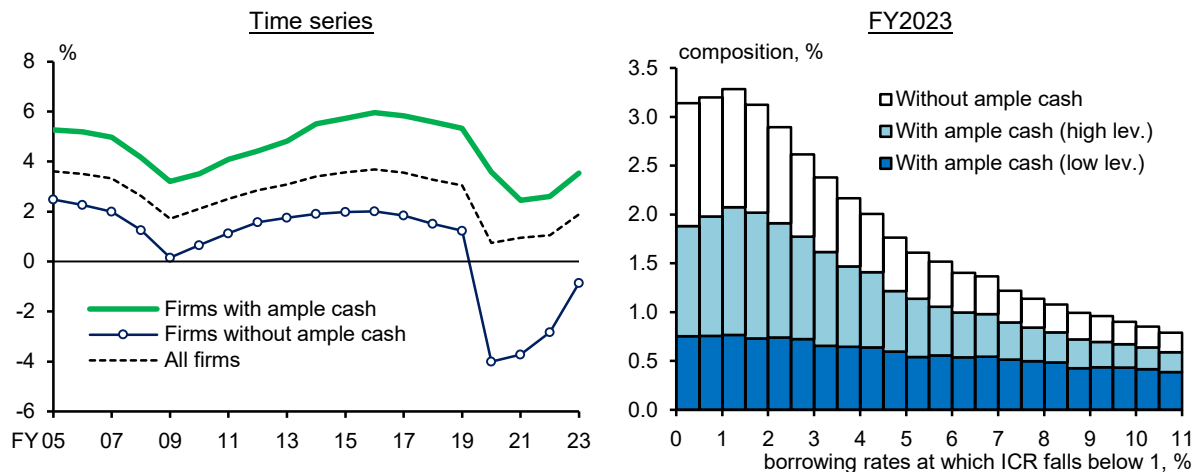
**Chart IV-1-14: Firms' financial conditions (by firm characteristic)**

Note: 1. Financial leverage is the ratio of borrowings to total assets. Cash reserve ratio is the ratio of cash reserves to short-term borrowings.  
2. "Firms without ample cash" and "Insolvent with operating loss" cover firms with excess borrowings. Shows the median values by firm characteristic.  
3. Covers SMEs. The vertical lines indicate the beginning of the pandemic.  
Source: CRD Association.

**Chart IV-1-15: Borrowing term and share of floating rates for corporate debt**

Note: "Borrowing term" shows estimated values based on borrowing data by maturity. The data for "Share of floating rate loans" are aggregate values of major and regional banks. Latest data as of fiscal 2023.  
Source: Ministry of Finance; BOJ.

However, there are some firms, albeit only a limited number overall, with borrowings exceeding cash and deposits, mainly firms without ample cash and firms that are making operating losses and are insolvent, whose resilience to changes in interest expenses appears to be weakening, as their leverage ratios are high and their ICRs remain low (Chart IV-1-14). Looking at the level of borrowing rates at which the ICR falls below one indicates that firms with ample cash are on the whole sufficiently profitable to withstand the burden of interest payments even at high interest rates (left panel of Chart IV-1-16).<sup>27</sup> However, looking at the distribution of firms in terms of the borrowing rate at which their ICR falls below one shows that, in the range of 1-2 percent, which is the average level of lending rates at present, there are not only firms without ample cash but also some firms

**Chart IV-1-16: Borrowing rates at which ICR falls below 1 (SMEs with excess borrowings)**

Note: Covers SMEs with excess borrowings. The left-hand chart shows the median values. Firms with cash reserves of less than half of their annual administrative expenses are grouped as "Firms without ample cash" and other firms as "Firms with ample cash." For the latter group, those with a financial leverage at or higher than the median of SMEs with excess borrowings are grouped as "high lev.," and those lower than the median as "low lev." in the right-hand chart.  
Source: CRD Association.

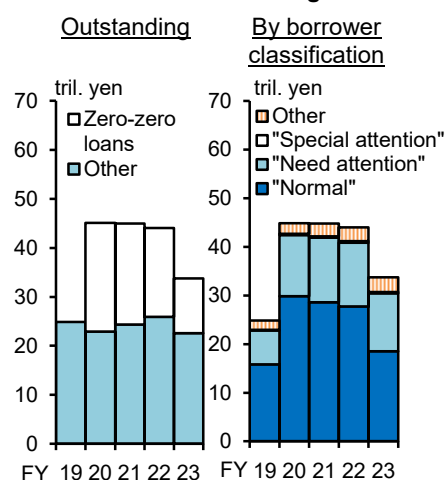
<sup>27</sup> In the estimation shown in Chart IV-1-16, the pass-through rate of market interest rates is assumed to be 100 percent for funding rates such as borrowing rates and 50 percent for rates on investments such as deposits.

with high leverage ratios despite having ample cash (right panel of Chart IV-1-16). In particular, there seem to be a greater number of highly leveraged firms among firms that increased their cash reserves through borrowing around the time of the pandemic, and especially among those firms that are still paying back such loans as a result of a subdued recovery in corporate profits.

### Financial conditions of zero-zero loan recipients

Since the outbreak of the pandemic, loans guaranteed by credit guarantee corporations, including large-scale effectively interest-free and unsecured loans (so-called zero-zero loans), have been extended to firms to support their cash flow and other needs (Chart IV-1-17). The outstanding amount of guaranteed loans has been declining as a whole as principal repayments on zero-zero loans have gathered pace.<sup>28</sup> By borrower classification, loans to "normal" borrowers, which likely include precautionary borrowings, have begun to decline at all types of banks, and the share of loans to borrowers classified as "need attention" and below in the remaining amount outstanding has increased. While zero-zero loans are protected by credit guarantees and do not directly result in credit costs for banks, if a borrower also has a regular loan, the regular loan may give rise to credit costs for the lending bank. The following examines the financial conditions of zero-zero loan recipients using granular data from the common data platform, a new data collection and management framework aimed at data integration between the Financial Services Agency (FSA) and the Bank of Japan.<sup>29</sup>

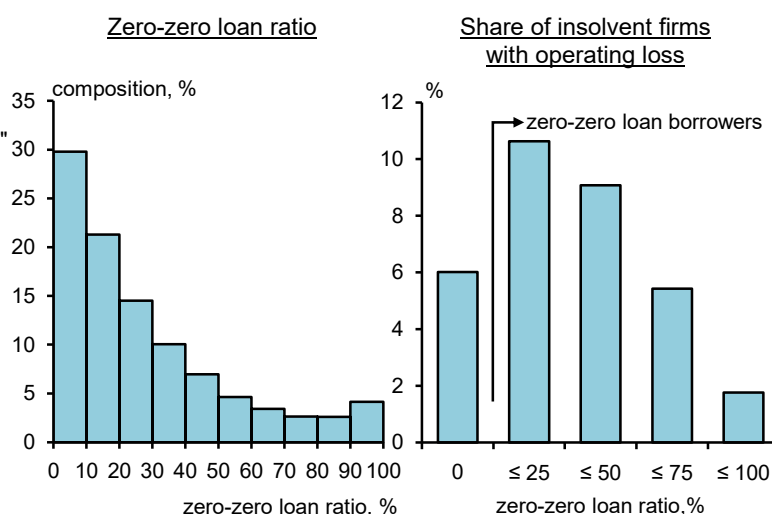
**Chart IV-1-17: Guaranteed loans outstanding**



Note: 1. Covers major, regional, and *shinkin* banks. Figures are as of the end of each fiscal year.  
2. "Zero-zero loans" for fiscal 2020 in the left-hand chart is an estimated value.  
3. The right-hand chart excludes loans that have no borrower classification and loans to local governments. "Need attention" indicates "Need attention excluding special attention," and "Other" indicates "In danger of bankruptcy" and below.

Source: BOJ.

**Chart IV-1-18: Zero-zero loan ratio and financial conditions**



Note: 1. Based on data as of end-September 2023 collected from regional banks I.  
2. Zero-zero loan ratio is the ratio of outstanding zero-zero loans to total borrowings.  
3. Covers SMEs with loans outstanding from regional banks I. The left-hand chart excludes firms with a zero-zero loan ratio of 0%. The right-hand chart includes such firms.

Source: BOJ.

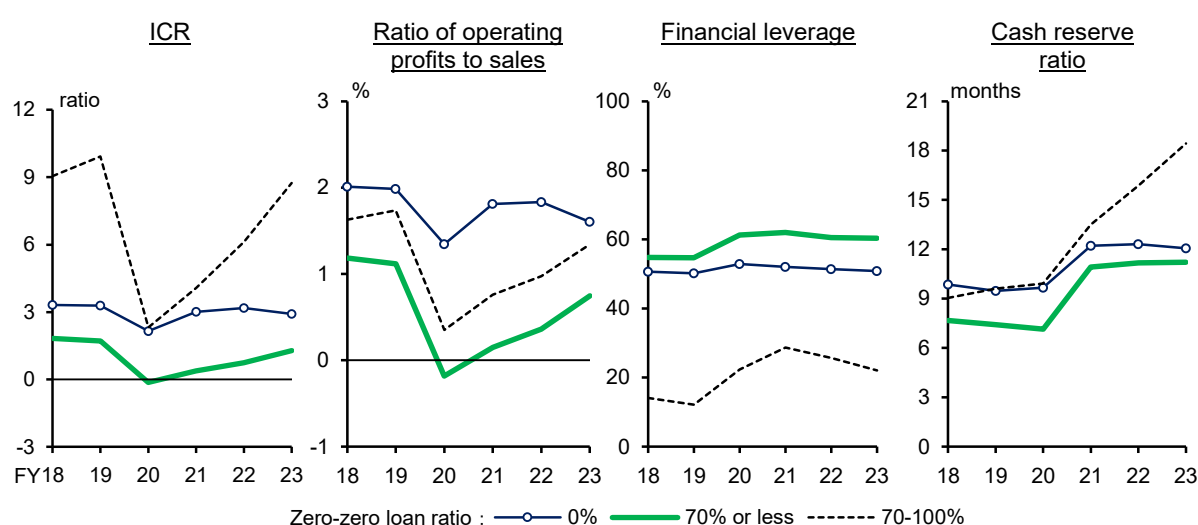
<sup>28</sup> With the interest subsidy period coming to an end, repayment starts recently peaked from July 2023 to April 2024.

<sup>29</sup> Specifically, the analysis uses detailed loan data from the common data platform to identify loans that match the lending terms and conditions for zero-zero loans and regards other loans as regular loans. See Box 4 for details.



Grouping firms using zero-zero loans as of the end of September 2023 in terms of the share of zero-zero loans in their total borrowings shows that the share of firms whose borrowings consist entirely of zero-zero loans is less than 10 percent, and for the majority of firms, zero-zero loans make up only a small share of their total borrowings (left panel of Chart IV-1-18). Next, grouping firms in terms of their current share of zero-zero loans in total borrowings and looking at their financial conditions shows that firms that rely on both zero-zero and regular loans are more likely to have operating losses and be insolvent than firms that do not (right panel of Chart IV-1-18). Moreover, various financial indicators show that these firms have tended to be in an unfavorable financial conditions both before and after the pandemic (Chart IV-1-19). This suggests that a certain number of firms whose financial conditions were already weak before the pandemic may have continued to keep zero-zero loans without making prepayments after the interest subsidy period ended as a result of the stress such as the pandemic and the subsequent high raw material costs.

**Chart IV-1-19: Financial conditions of SMEs with zero-zero loans**



Note: 1. Shows the median values for each group based on the ratio of outstanding zero-zero loans to total borrowings at end-September 2023.

2. Financial leverage is the ratio of borrowings to total assets. Cash reserve ratio is the ratio of cash reserves to monthly average administrative expenses.

3. Covers SMEs with loans outstanding from regional banks I.

Source: BOJ.

## 2. Foreign credit risk

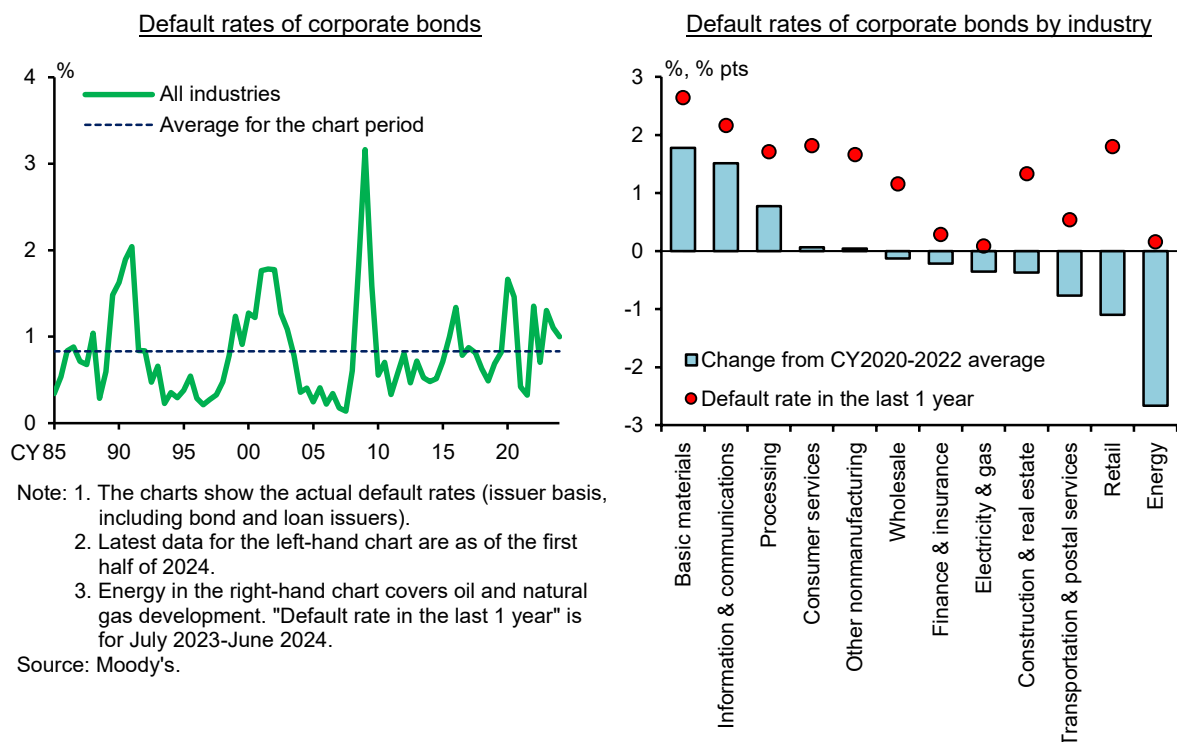
Corporate bond default rates overseas have been slightly higher than the past average amid the global tightening of financial conditions (Chart IV-1-20). By industry, default rates have declined in the retail and the transportation and postal services industries, which had temporarily been severely affected by the pandemic, while they have increased recently in the basic materials and information and communications.

Under these circumstances, Japanese banks' foreign credit risk has remained low (Chart IV-1-21). While non-performing loan (NPL) ratios and credit cost ratios have increased due to the downgrading of some large borrowers, the share of investment grade loans has remained high. Loan-loss provision ratios have been at relatively high levels, partly due to an increase in loan-loss provisions reflecting the correction in the U.S. real estate market and forward-looking loan-loss provisioning. The break-even credit cost ratio of banks' international business (net interest income on foreign loans/foreign loans outstanding) remains relatively high, and even if considerable credit costs were to be incurred, they could be absorbed by net interest income. However, banks need to closely manage risks, especially those associated with loans to low-rated borrowers and large loans.

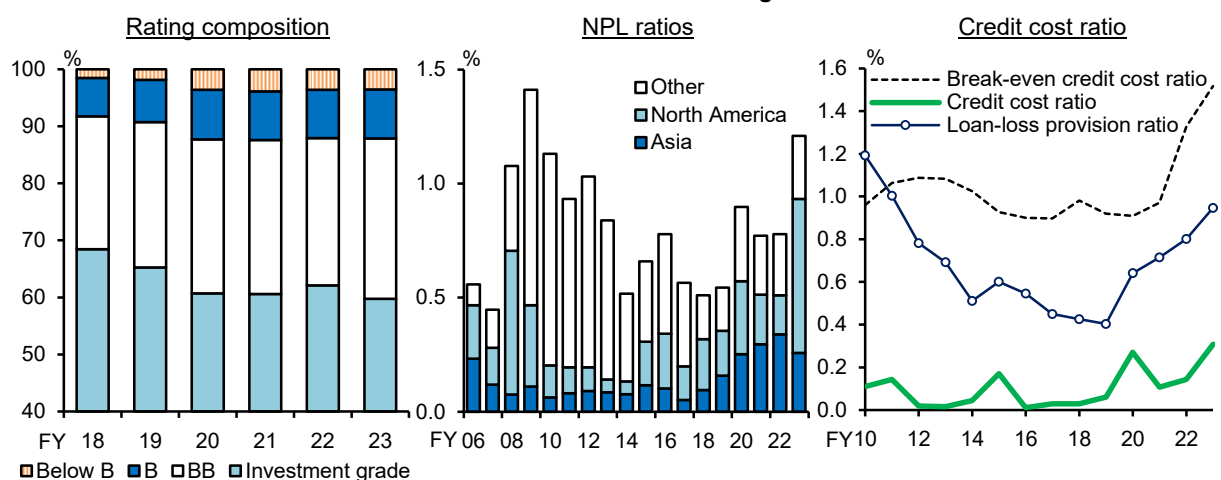
#### IV. Risks faced by financial institutions

##### A. Credit risk

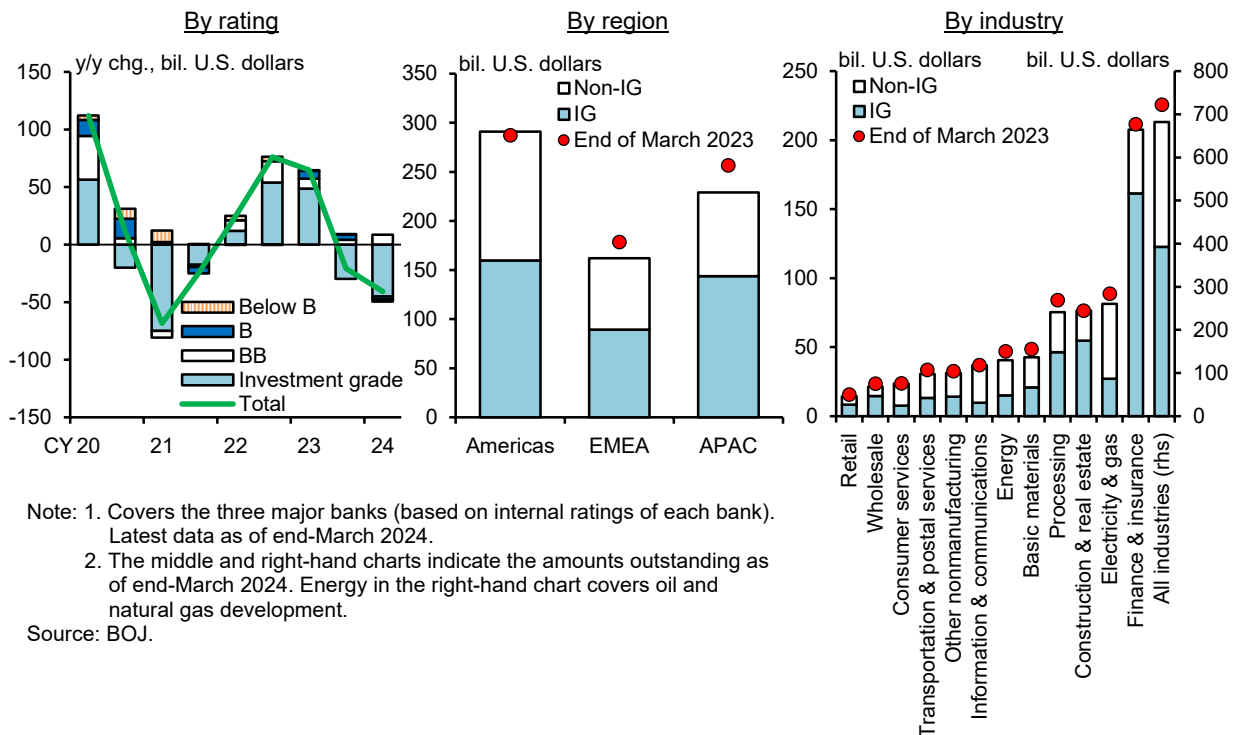
**Chart IV-1-20: Default rates of corporate bonds**



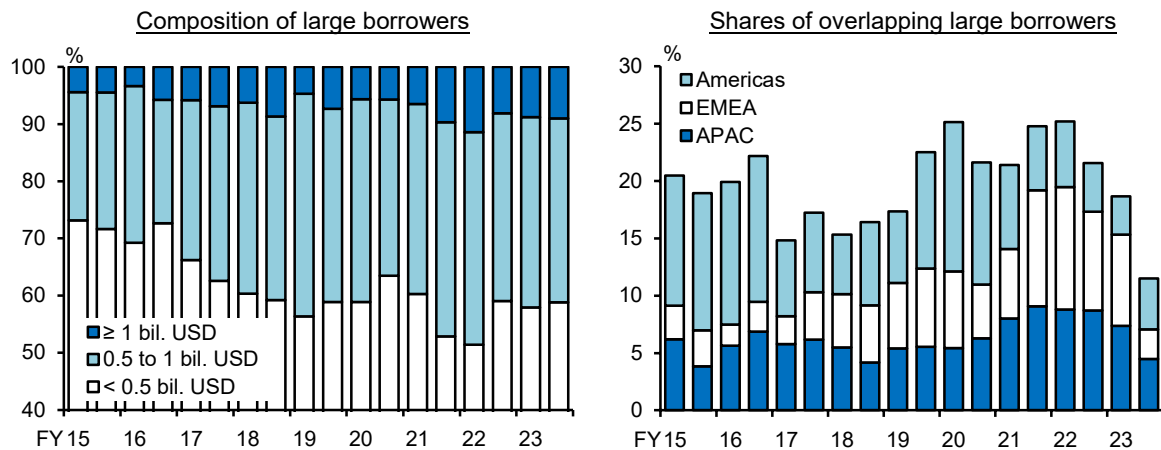
**Chart IV-1-21: Credit costs of foreign loans**



Major banks, which focus on capital efficiency, have been selective in their foreign lending, by for example reviewing loans to low-return borrowers. As a result, they have recently reduced loans to low-return borrowers that had been included in loans to investment grade borrowers (Chart IV-1-22). By region, loans to the Europe, Middle East, and Africa (EMEA) region and the Asia-Pacific (APAC) region have declined, and by industry, loans to the manufacturing industry have decreased.

**Chart IV-1-22: Risk profiles of foreign loans**

Meanwhile, the trend to larger foreign loans has come to a halt. Looking at the loan amount per large borrower, the share of loans of 1 billion U.S. dollars or more has been unchanged (left panel of Chart IV-1-23). The share of common exposures, i.e., loans to borrowers overlapping among major banks, has declined as these banks have been selective in terms of loans to low-return borrowers, particularly in the EMEA and APAC regions (right panel of Chart IV-1-23).

**Chart IV-1-23: Foreign large borrowers**

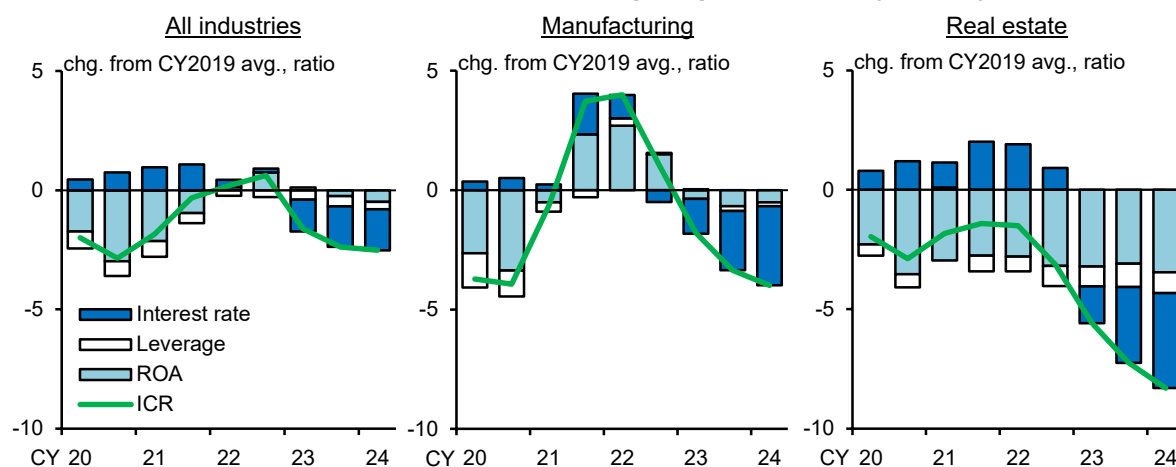
Note: 1. Covers the three major banks' large borrowers. The left-hand chart covers non-Japanese firms.  
2. The right-hand chart shows the shares of outstanding loans to large borrowers that overlap for all three major banks.  
3. Latest data as of end-March 2024.  
Source: BOJ.

Downgrades of borrowers due to an increase in firms' interest payment burdens have been limited to date. Looking at the financial conditions of large borrowers, however, their ICRs have been on a downtrend on average (Chart IV-1-24). Decomposing changes in the ICR shows that while the ICR for all industries had improved, mainly due to a recovery in the return on assets (ROA), which had temporarily declined during the pandemic, it has deteriorated once again due to the cumulative effects of the rise in interest rates. By industry, the decline in the ICR in the real estate industry has

IV. Risks faced by financial institutions  
A. Credit risk

been relatively large since the start of the pandemic, reflecting the continuing decline in the ROA due to deteriorating market conditions and the rise in interest rates.

**Chart IV-1-24: ICR trends of foreign large borrowers (by industry)**

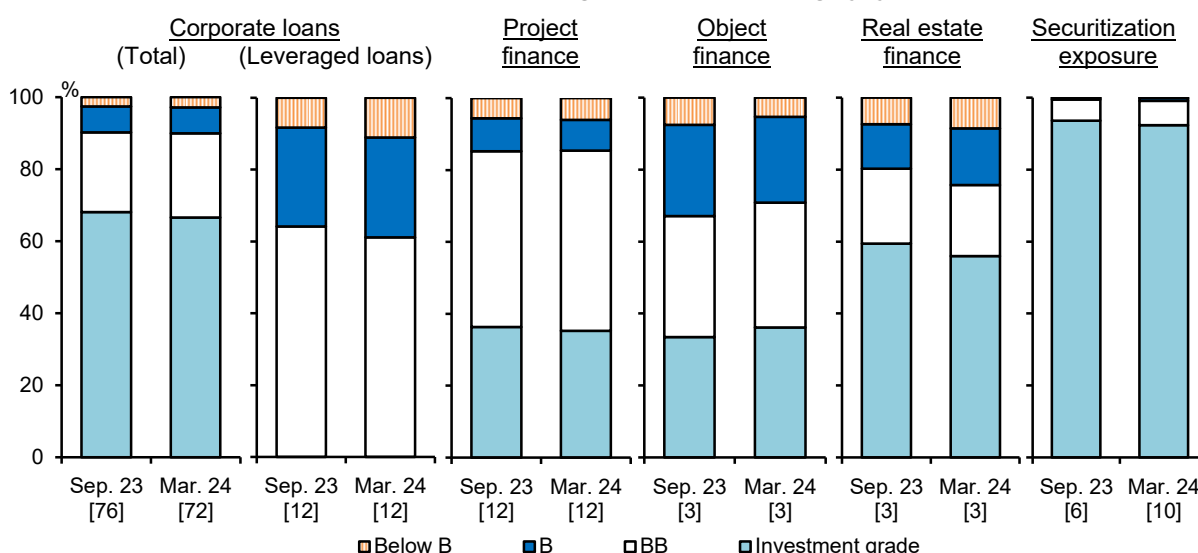


Note: Covers the three major banks' large borrowers. ICR is calculated as total EBITDA of all sample borrowers divided by total interest payments of all sample borrowers. Latest data as of the first half of 2024.

Source: S&P Global Market Intelligence; BOJ.

The composition of foreign loans' credit ratings by type of product shows that the quality of banks' foreign loan portfolios has been maintained on the whole (Chart IV-1-25). Investment grade loans have continued to account for almost 70 percent of corporate loans on the whole. Moreover, the share of investment grade loans in project finance loans, which entail relatively high risk, is unchanged, while that in object finance loans has risen due to an improvement in aircraft-related demand. On the other hand, with regard to leveraged loans and real estate finance, which are susceptible to a rise in interest rates, the share of loans to low-rated borrowers has been increasing.

**Chart IV-1-25: Composition of foreign loans' credit rating by type of product**



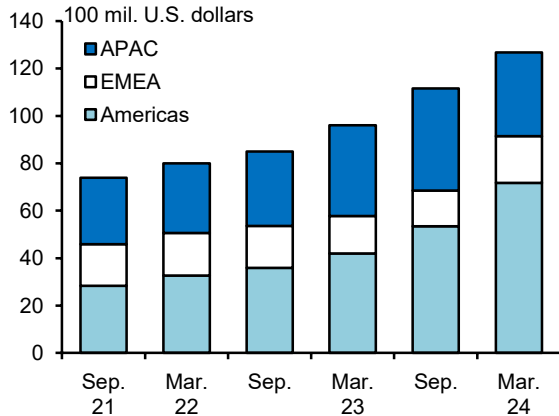
Note: Rating composition of foreign currency-denominated loans. Figures in brackets indicate the share of the respective product types. The charts cover major banks, Japan Post Bank, and a central organization of financial cooperatives. Source: BOJ.

Looking at major banks' real estate financing (non-recourse loans) by region, non-investment grade loans have continued to increase, especially in the Americas, reflecting increases in downgrades and the amount of loans extended (Chart IV-1-26). Depending on developments in foreign real

estate markets, borrowers' creditworthiness could deteriorate rapidly or the recovery rate for loans in the event of a default could decline. While major banks' real estate financing accounts for only 3 percent of their total foreign loans (of which financing in the Americas accounts for 1 percent), banks need to continue to refine their credit risk management, including in their decisions on the extension of loans and forward-looking management of existing loans.

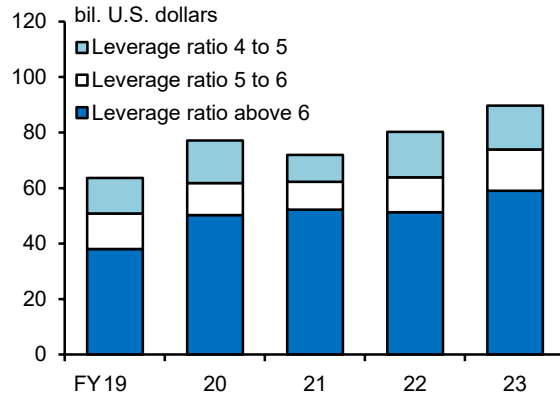
**Chart IV-1-26: Real estate finance**

Non-investment grade loans outstanding



Note: Covers major banks and others.  
Source: BOJ.

**Chart IV-1-27: Leveraged loans outstanding**



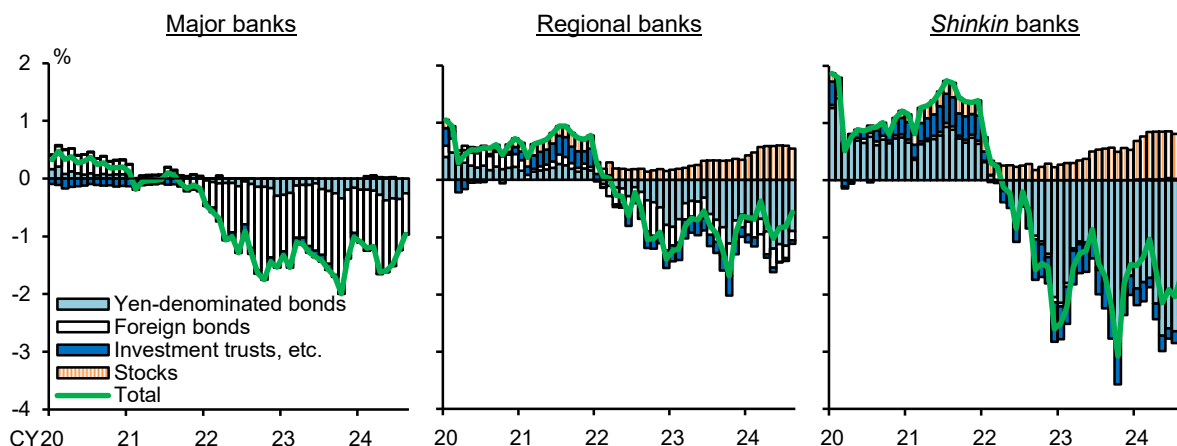
Note: Covers the three major banks.  
Source: BOJ.

Major banks have also increased their exposure to leveraged loans including leveraged buyout (LBO) loans, particularly loans to highly leveraged firms (Chart IV-1-27). By borrower classification, the outstanding amount of loans to borrowers classified as "need attention" and below in particular has been increasing recently due to the rise in interest rates to date. Since there are many cases where firms with high leverage are more vulnerable to additional shocks, banks need to carry out more cautious risk management.

## B. Market risk associated with securities investment

Banks' securities portfolios show that a further increase in valuation losses on securities holdings (including held-to-maturity securities and excluding strategic stockholdings) has been avoided despite rises in domestic long-term interest rates since last autumn, indicating that progress in portfolio rebalancing has suppressed valuation losses (Chart IV-2-1). However, stock prices in

**Chart IV-2-1: Valuation gains/losses on securities holdings**



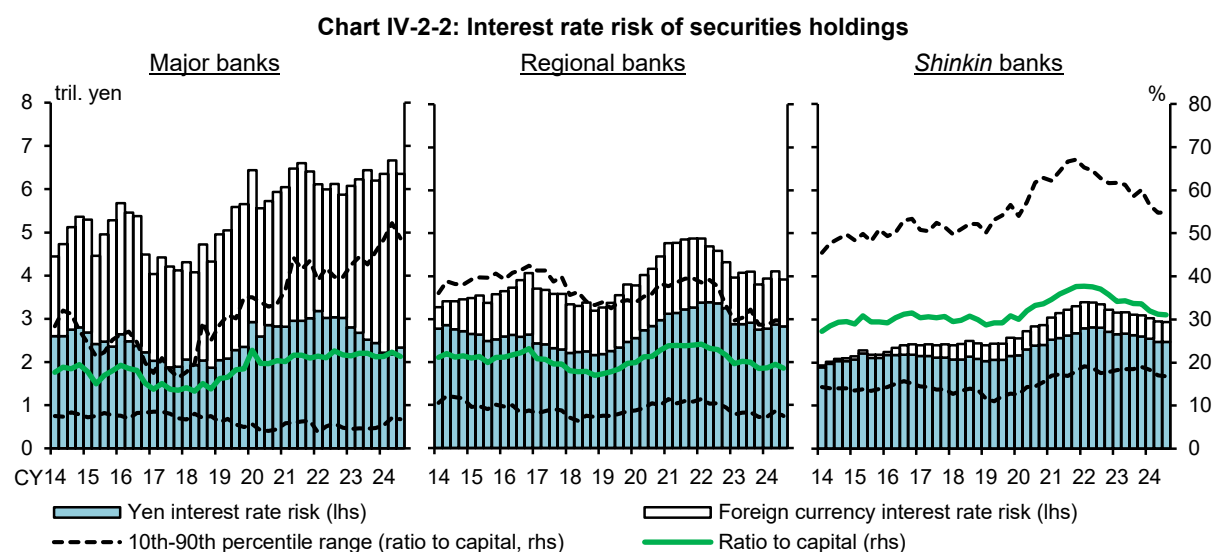
Note: Shows the ratio of valuation gains/losses on securities (including held-to-maturity securities and excluding strategic stockholdings) to risk-weighted assets. Latest data as of August 2024.

Source: BOJ.

domestic and foreign financial markets, after rising at a somewhat fast pace in mid-2024, have thereafter fluctuated significantly, and the implied volatility of government bond prices has also been trending at a somewhat high level (see Chapter II). Taking these points into consideration, this section provides an overview of banks' current market risk profiles.

### Interest rate risk

Looking at the amount of interest rate risk associated with banks' investment in yen-denominated bonds and foreign bonds -- in terms of the 100 basis point value (BPV) for yen interest rate risk and 200 BPV for foreign currency interest rate risk -- shows that banks' risk on yen-denominated bonds has been suppressed compared to before as holdings of yen-denominated longer-term bonds have declined (Chart IV-2-2). Meanwhile, the amount of interest rate risk associated with foreign bonds has increased as banks, particularly major banks, have increased holdings of such bonds in anticipation of a future decline in interest rates. Banks' overall interest rate risk-to-capital ratio -- which is calculated by adding the interest rate risk associated with yen-denominated bonds and that associated with foreign bonds -- has generally been unchanged. However, the interest rate risk associated with securities investment remains at a high level. In addition, when interest rate volatility rises, it may become difficult for banks to adjust their positions in a nimble manner. Therefore, careful management of interest rate risk is needed (see Section A of Chapter III and Section D of Chapter IV on banks' rebalancing of yen-denominated bondholdings and foreign bondholdings).



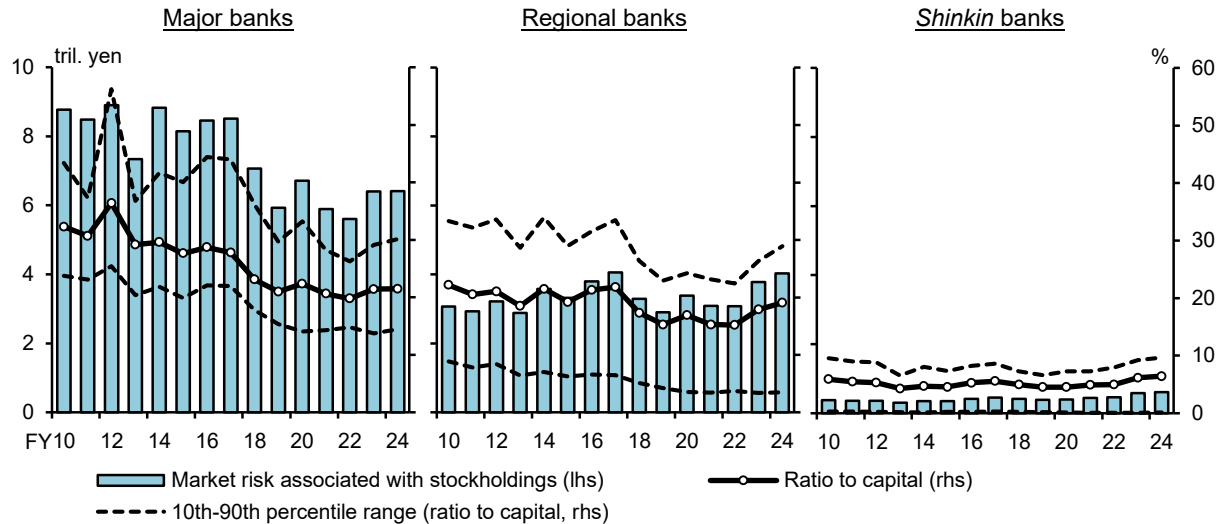
Note: "Yen interest rate risk" is a 100 BPV and "Foreign currency interest rate risk" is a 200 BPV. Off-balance-sheet transactions are taken into account (excluding yen interest rate risk of major banks). Latest data as of August 2024.  
Source: BOJ.

### Market risk associated with stockholdings

The pace of decline in market risk associated with stockholdings has decelerated (Chart IV-2-3). For major banks and regional banks, the amount of market risk has been at around 20 percent of their capital, implying that the size of their stockholdings remains large enough to potentially have a substantial impact on their balance sheets and profits. While a decline in strategic stockholdings has reduced market risk, developments in domestic and foreign financial markets have been unstable, and a rise in stock price volatility could lead to an increase in the market risk associated with stockholdings. Banks therefore need to make an objective assessment of the costs and benefits of stockholdings from various perspectives, such as the risk and return associated with

their stockholdings, corporate governance, and regulatory compliance. Furthermore, they need to keep the market risk associated with stockholdings within an appropriate range, in line with their loss-absorbing capacity.<sup>30</sup>

**Chart IV-2-3: Market risk associated with stockholdings**



Note: 1. "Market risk associated with stockholdings" is VaR with a 99 percent confidence level and a 1-year holding period, and excludes risk associated with foreign currency-denominated stockholdings. Latest data as of August 2024.

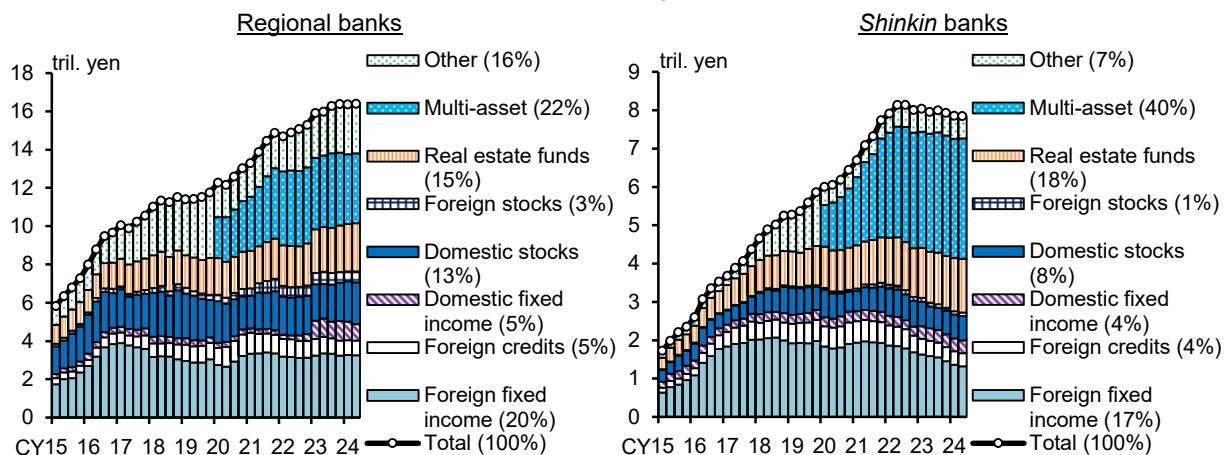
2. "Ratio to capital" is calculated using CET1 capital for internationally active banks from fiscal 2012 onward, core capital for domestic banks from fiscal 2013 onward, and Tier 1 capital for all others (excl. the transitional arrangements).

Source: BOJ.

### Diversification in market risks

With the prolonged low interest rate environment in Japan, banks' securities investments have included financial products other than bonds and stocks. In recent years, regional and *shinkin* banks especially have used investment trusts for securities investments and as a result are exposed to various risk factors (Chart IV-2-4). In particular, many have taken on foreign currency interest rate risk through multi-asset investment trusts and foreign fixed income investment trusts.

**Chart IV-2-4: Breakdown of outstanding amount of investment trusts**



Note: 1. Based on book values. The figures in parentheses indicate the share of the respective product types in the latest period. Latest data as of June 2024.

2. Up to December 2019, "Other" includes "Multi-asset."

Source: BOJ.

<sup>30</sup> For details on the risk and return on stockholdings, corporate governance, and regulatory compliance, see Section B of Chapter IV in the October 2023 issue of the *Report*.



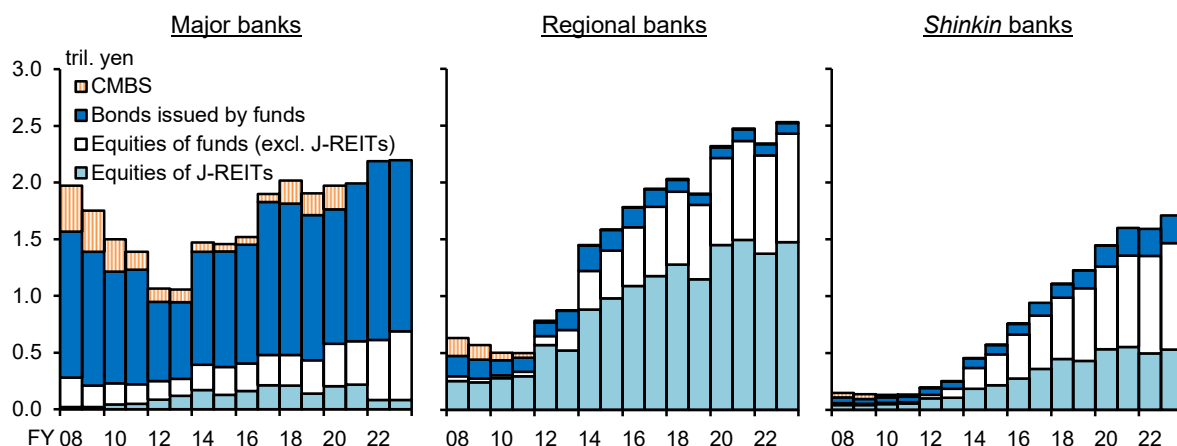
#### IV. Risks faced by financial institutions

##### B. Market risk associated with securities investment

Banks need to have a system in place to conduct cross-sectional checks of various risk factors inherent in investment trusts and to closely monitor developments in overall profits and losses, including the risks of negative spreads and of valuation losses.

From a long-term perspective, banks have been increasing their investment in domestic real estate funds to secure investment yields (Chart IV-2-5). Although banks' real estate risk measured as a ratio to their capital has been limited on average, attention needs to be paid to the risk of a decline in the market value of such real estate investment funds due to a decline in the prices or rental income of properties held by real estate investment trusts (REITs) and other funds (Chart IV-2-6).

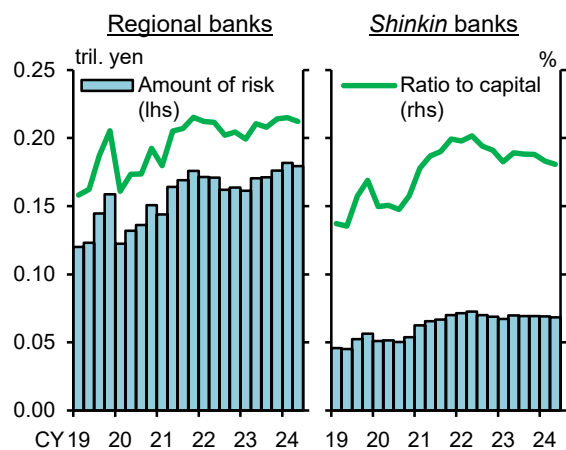
**Chart IV-2-5: Real estate-related securities investment**



Note: From fiscal 2021 onward, the data for "CMBS" of major banks are missing values. Latest data as of fiscal 2023.

Source: BOJ.

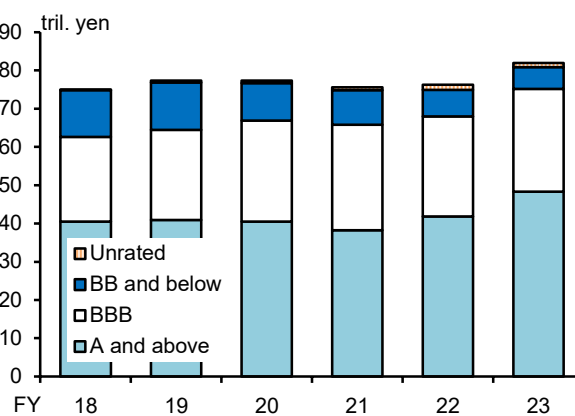
**Chart IV-2-6: Real estate risk**



Note: "Amount of risk" refers to changes in the market value when REIT indexes decline by 10 percent. Up to end-2019, foreign securities are excluded. Latest data as of June 2024.

Source: BOJ.

**Chart IV-2-7: Foreign credit product investment by rating**



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

Source: BOJ.

The outstanding amount of investment in foreign credit products by banks has started to increase, reflecting growing demand for products issued under the existing high interest rates in anticipation of a future decline in interest rates. However, overall, banks have been cautious in their risk-taking, preferring products with a high rating (Charts III-1-17 and IV-2-7). According to reports from banks, their holdings of securitized products, including collateralized loan obligations (CLOs) -- credit products that are backed by leveraged loans -- have continued to consist almost entirely of AAA-rated tranches. That said, given that uncertainties regarding foreign economies remain high, banks that engage in foreign credit product investment need to continuously increase the sophistication



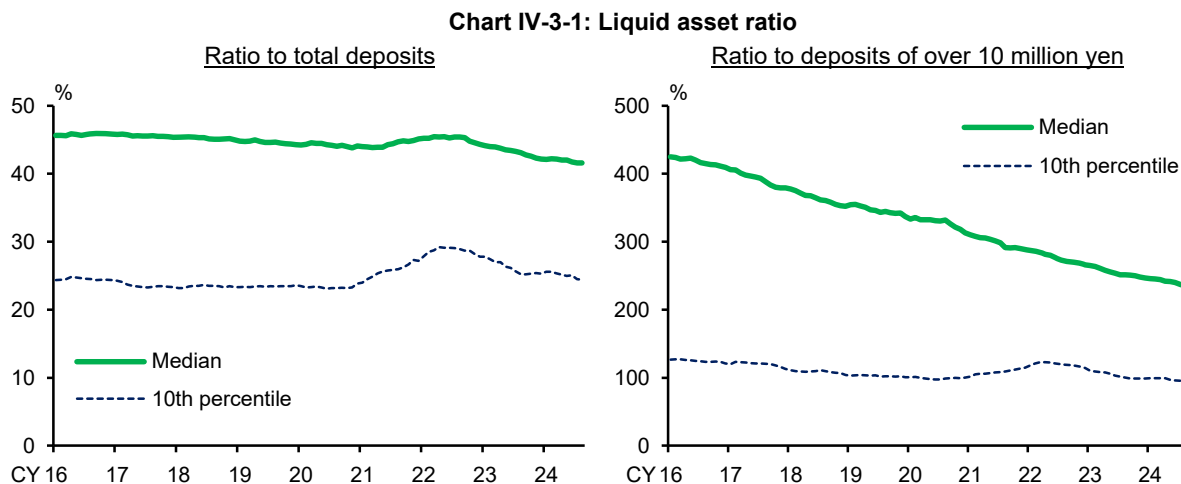
of their risk management while paying attention to changes in recent economic and price developments and interest rates.

## C. Funding liquidity risk

### Yen funding liquidity risk

In terms of their yen funding, banks have ample liquidity, mainly backed by small, sticky retail deposits. Moreover, deposits outstanding far exceed loans outstanding. This stable funding base has enabled banks to secure yen funding at low interest rates.

Another factor contributing to the high stability of funding bases is that a large portion of the loan-to-deposit gap is deposited with the Bank or invested in highly liquid securities such as Japanese government bonds (JGBs). The level of liquid assets -- the sum of first-line reserves (deposits, unused collateral, etc.) that can be monetized on the same day and second-line reserves that can be monetized within a week (bonds with high market liquidity, etc.) -- averages about 40 percent of total deposits and about 240 percent of deposits exceeding the deposit insurance ceiling of 10 million yen (Chart IV-3-1).<sup>31</sup> This means that banks have sufficient reserves even in the event of a severe situation in which uninsured deposits are fully withdrawn within one week.



Note: 1. The right-hand chart shows the ratios to retail and corporate deposits of over 10 million yen (excl. current deposits).

2. Covers regional and *shinkin* banks. 12-month backward moving averages. Latest data as of August 2024.

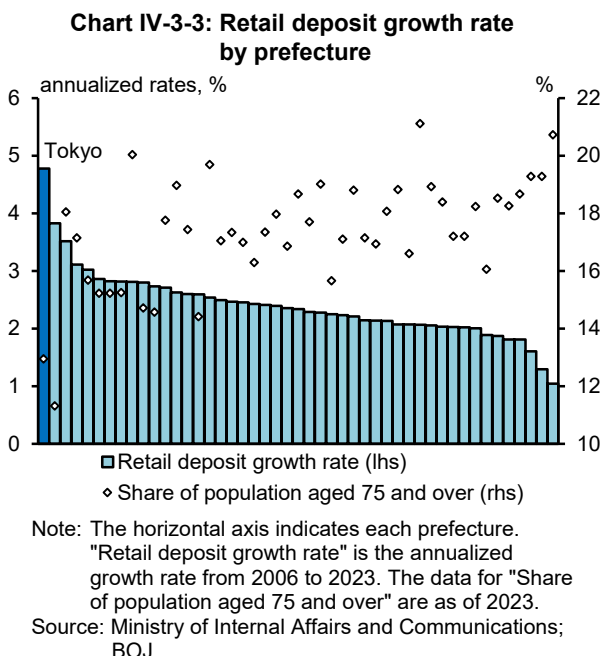
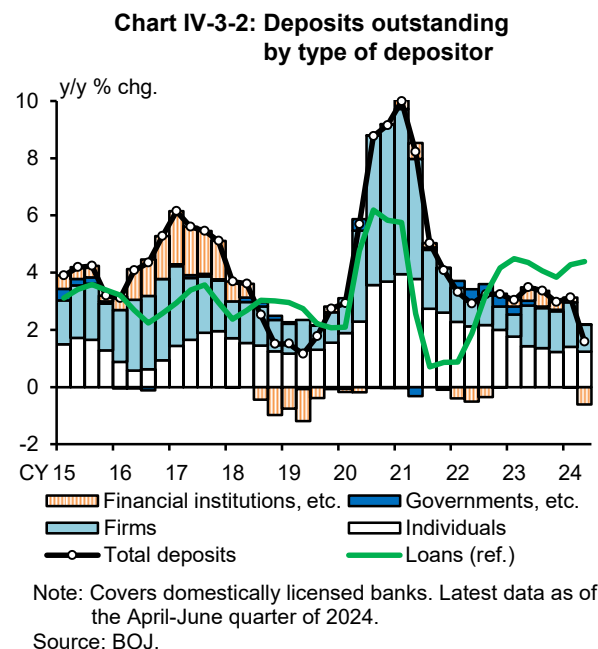
Source: BOJ.

Looking at deposits outstanding by type of depositor, deposits from both individuals and firms have continued to grow (Chart IV-3-2). While corporate deposits, which had increased during the pandemic, have continued to rise on the back of increased sales due to the economic recovery, the growth in corporate deposits has decelerated with factors such as progress in the repayment of pandemic-related loans, a slowdown in fiscal spending, and an increase in corporate tax payments acting as brakes. Retail deposits have continued to increase at a largely steady year-on-year rate on the back of rising wages. From a somewhat longer-term perspective, however, attention should be paid to the possibility of a gradual outflow of deposits at regional and *shinkin* banks, for example, due to the declining and aging population. Many cases have been reported where deposits that were inherited have been transferred from banks in rural areas, where

<sup>31</sup> From a long-term perspective, the liquid asset ratio when using deposits exceeding the deposit insurance ceiling of 10 million yen as the denominator has been declining on average, partly because such deposits have increased due to a rise in corporate deposits.

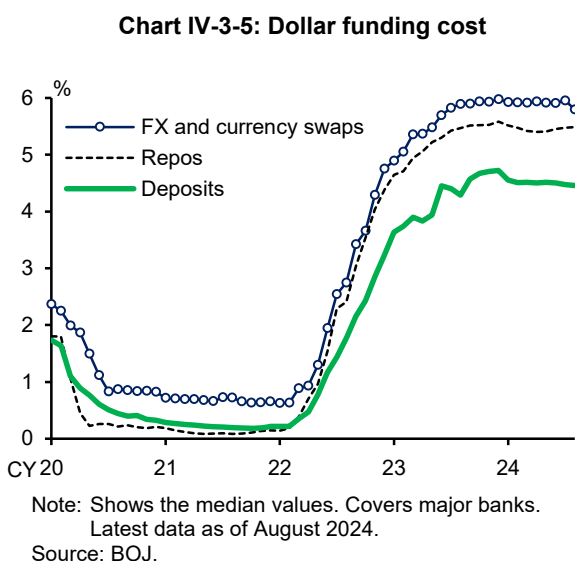
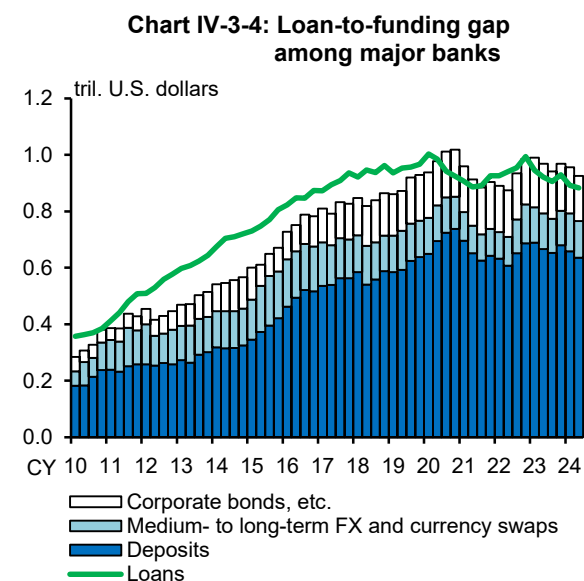
IV. Risks faced by financial institutions  
C. Funding liquidity risk

decedents had their accounts, to banks in urban areas, where heirs have their accounts. In fact, looking at the growth rate in retail deposits by prefecture, the rate tends to be higher in regions such as Tokyo with a lower population share of those aged 75 and over (Chart IV-3-3). Banks need to closely monitor the impact of their business environment on their deposit funding.



*Foreign currency funding liquidity risk*

Banks have maintained stable foreign currency funding in view of uncertainty over future financial and economic conditions. Looking at the loan-to-funding gap of major banks -- the difference between the outstanding amount of loans and the outstanding amount of long-term funding, such as through the issuance of corporate bonds, and deposits -- relatively stable funding exceeds their



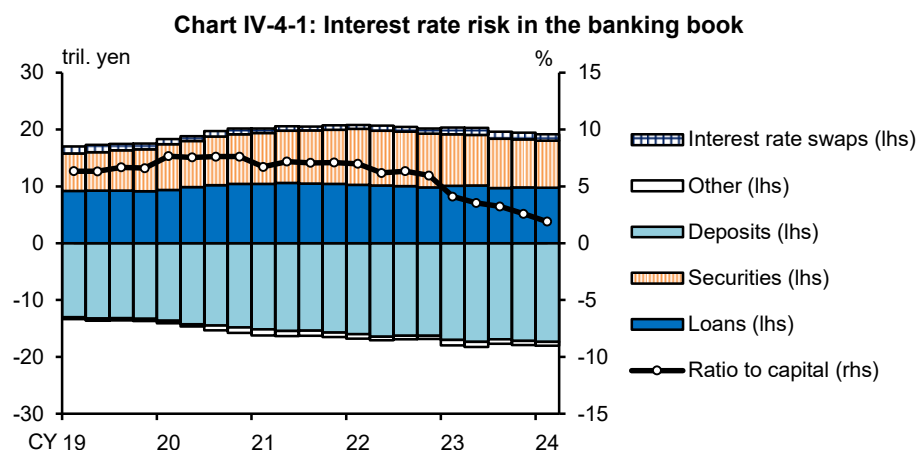
loans (Chart IV-3-4). Meanwhile, the U.S. dollar funding environment has remained stable. While dollar funding costs have been at a high level due to the cumulative effects of the rise in U.S. short-term interest rates, the dollar funding premiums of Japanese banks have been stable (Chart IV-3-5).

Banks need to ensure a stable foreign currency funding base, taking into account the costs and risk characteristics associated with each funding means. Major banks need to continue their efforts focusing on stable funding such as sticky deposits and long-term market funding.

## D. Risks surrounding balance sheet management

### 1. Resilience to rising interest rates

Yen interest rate risk in the banking book (IRRBB, in terms of the 100 BPV) relative to banks' capital has remained low, indicating that banks overall have sufficient loss-absorbing capacity (Chart IV-4-1).<sup>32</sup> Looking at banks as a whole, the amount of yen interest rate risk on the asset side (loans and securities) and the liability side (deposits) is more or less in balance.



Note: Shows yen interest rate risk in terms of the 100 BPV. Latest data as of end-March 2024.  
Source: BOJ.

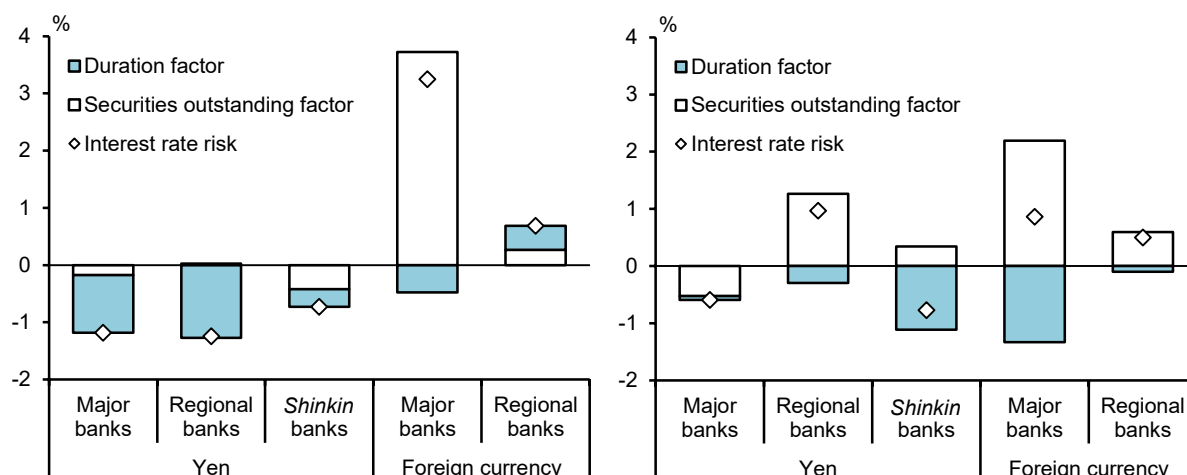
Looking at banks' rebalancing on the asset side, the shortening of the duration of yen-denominated bondholdings since last year has continued (Chart IV-4-2). Although some banks have recently been purchasing medium-term bonds in order to secure profits, overall, banks have maintained a cautious stance toward interest rate risk-taking due to the prospects of monetary policy revisions.<sup>33</sup> An increasing number of banks have shifted their portfolios to held-to-maturity bonds or to repackaged loans backed by yen-denominated bonds, neither of which are subject to mark-to-market valuation (Chart IV-4-3). Among regional banks, there has been a tendency for those with a higher share of yen-denominated bonds held to maturity to increase their yen interest rate risk (including securities held to maturity) (Chart IV-4-4).

<sup>32</sup> The estimates of the yen interest rate risk on the liability side take into account that some of the demand deposits that have no maturity are sticky deposits, i.e., core deposits, that remain in accounts for a long time. For a discussion of the stickiness of core deposits, see Box 2 in the October 2023 issue of the *Report*.

<sup>33</sup> As for foreign bonds, there have also been moves, especially among major banks, to increase holdings with the aim of obtaining capital gains in anticipation of lower interest rates in the future. See also Section A of Chapter III.

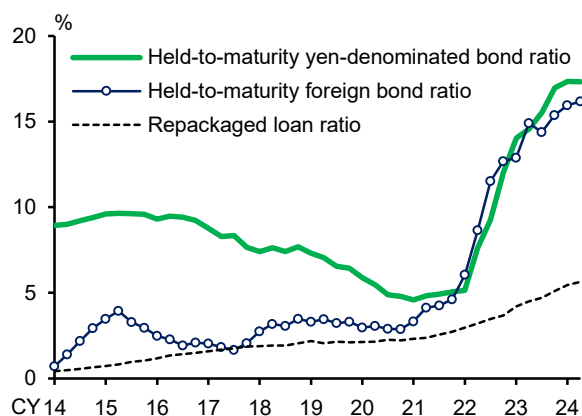
IV. Risks faced by financial institutions  
D. Risks surrounding balance sheet management

**Chart IV-4-2: Factors affecting changes in interest rate risk**  
In 2023 From the beginning of 2024



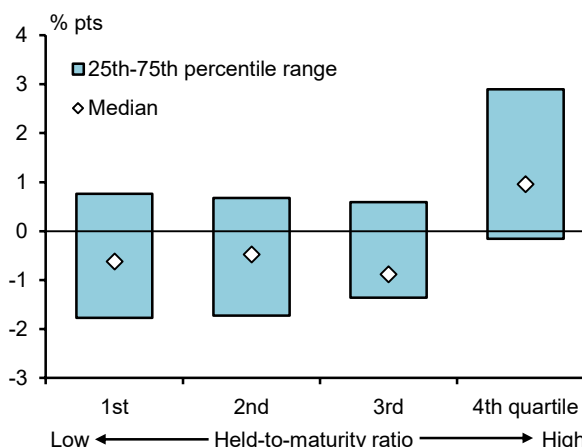
Note: Shows the changes in interest rate risk (100 BPV for yen and 200 BPV for foreign currency) as ratios to capital.  
The right-hand chart shows the changes from the beginning of 2024 to end-August.  
Source: BOJ.

**Chart IV-4-3: Ratio of bondholdings without mark-to-market valuations**



Note: 1. "Held-to-maturity ratio" refers to the ratios to yen-denominated and foreign bondholdings, respectively. Covers major, regional, and *shinkin* banks.  
2. "Repackaged loan ratio" refers to the ratios to yen-denominated bondholdings. Covers regional and *shinkin* banks.  
3. Latest data as of June 2024.  
Source: BOJ.

**Chart IV-4-4: Changes in yen interest rate risk by held-to-maturity ratio (regional banks)**



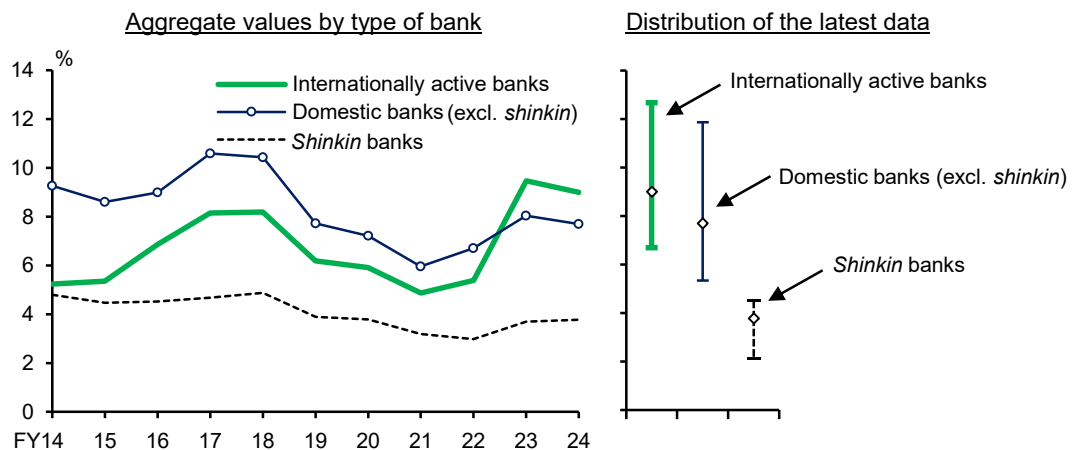
Note: For each quartile of held-to-maturity yen-denominated bond ratio as of August 2024, shows the medians (markers) and 25th-75th percentile ranges (bands) of changes from end-2023 to August 2024 in yen interest rate risk (100 BPV) as ratios to capital. Covers regional banks.  
Source: BOJ.

Those banks in particular that expect yen interest rates to rise in the future have shortened durations on the asset side; as a result, banks' resilience to rising yen interest rates is increasing on average. To examine banks' resilience to rising interest rates, it is instructive to estimate the interest rate on 10-year JGBs at which banks can maintain sufficient loss-absorbing capacity. In doing so, a simple reverse stress test is employed that takes into account a worsening of valuation losses on securities given a rise in market interest rates from the most recent level. Specifically, upward parallel shifts of the yield curve at each point in time are assumed. For analytical purposes, in this exercise, the sufficiency of loss-absorbing capacity is judged by whether banks can maintain their capital adequacy ratios at the regulatory levels, taking valuation gains/losses on all investment securities into account, rather than on a regulatory capital basis.<sup>34</sup> Furthermore, domestic banks'

<sup>34</sup> Specifically, all securities are evaluated on a mark-to-market basis, regardless of whether they are held to maturity or whether they are included in regulatory capital.

valuation gains/losses on securities are included in their capital adequacy ratios in the same manner as those for internationally active banks. Potential management actions by banks in response to a rise in interest rates, such as adjustment of their positions using interest rate hedging or through loss-cutting, are not taken into account in this simulation and in the following analyses in this section. The simulation results show that all types of banks can maintain a considerable level of economic capital even if yen interest rates increase (Chart IV-4-5). However, there is heterogeneity in the extent of rebalancing, and some banks have been relatively slow to reduce their interest rate risk exposure, given their high level of interest rate risk to begin with.

**Chart IV-4-5: Interest rate at which the required capital adequacy ratios are maintained when valuation gains/losses on all investment securities are taken into account**

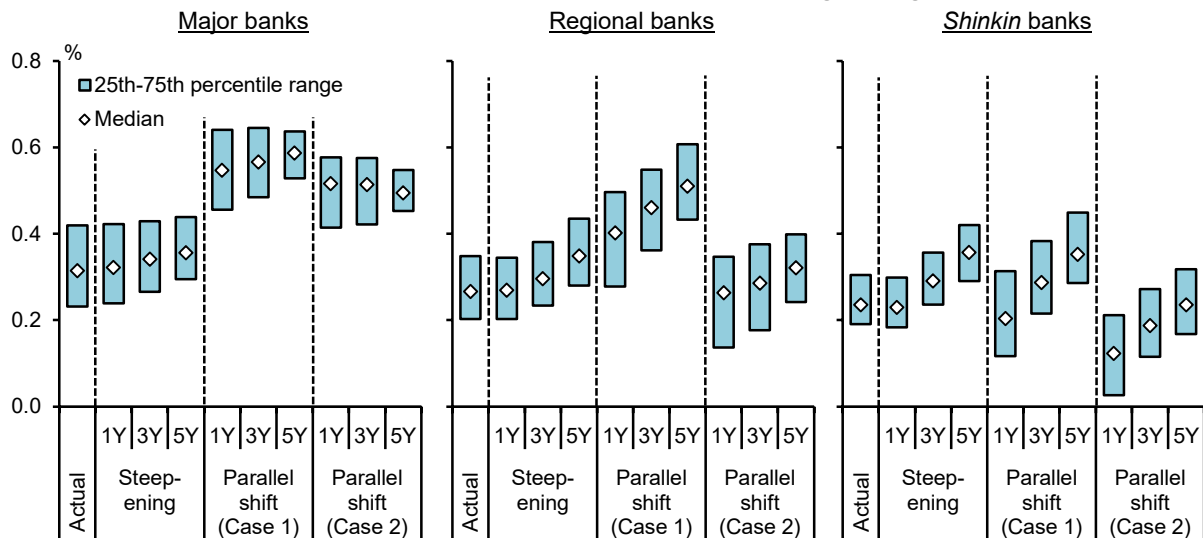


Note: Shows the level of 10-year JGB yields at which capital adequacy ratios remain above the regulatory level when valuation gains/losses on securities not included in regulatory capital are taken into account.

The bands in the right-hand chart indicate 25th-75th percentile ranges. Latest data as of August 2024.

Source: Ministry of Finance; BOJ.

**Chart IV-4-6: Levels of ROA based on PPNR excluding trading income**



Note: 1. Shows the simulation results when 10-year JGB yields increase by 1 percentage point (short-term rates remain unchanged for "Steepening" and increase by 1 percentage point for "Parallel shift"). Interest rate pass-through for short-term prime rate-linked loans and fixed-rate loans is assumed to be 100 percent for "Steepening" and "Parallel shift (Case 1)" and 50 percent for "Parallel shift (Case 2)."

2. Actual values are as of fiscal 2023 (profits and losses from investment trusts due to cancellations are excluded).

The horizontal axes indicate the number of years after an increase in interest rates.

Source: BOJ.

Next, the change in banks' pre-provision net revenue (PPNR) excluding trading income in response to rising yen interest rates is estimated based on some simplifying assumptions regarding the

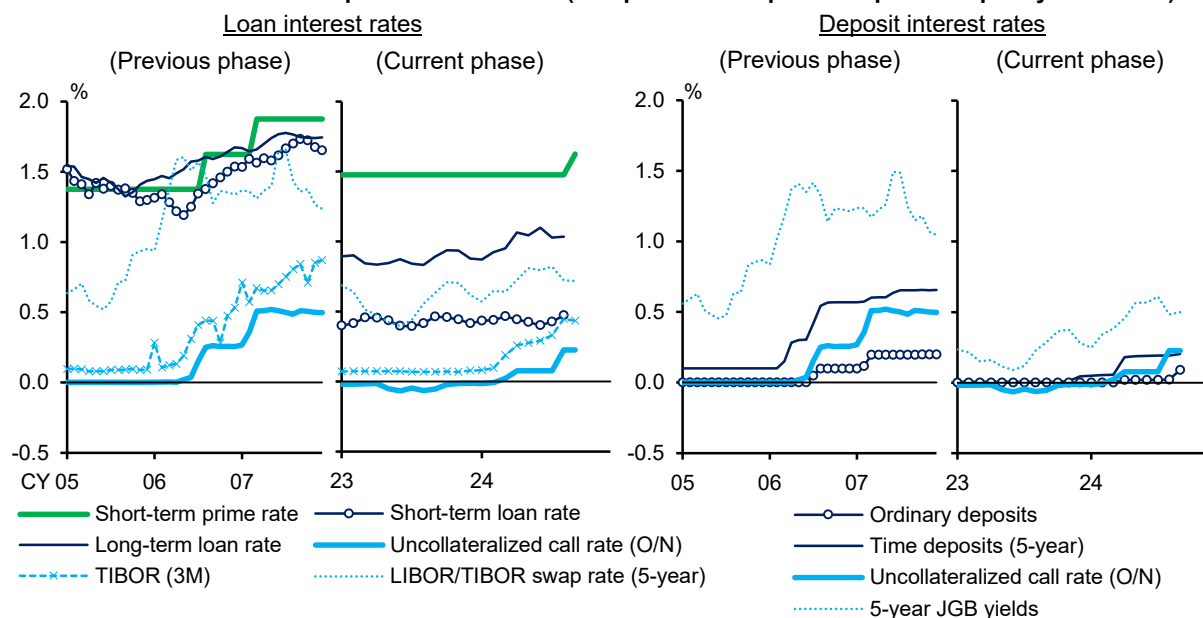
shape of the yield curve and the size of the interest rate increase (Chart IV-4-6).<sup>35</sup> The results show that for all types of banks a steepening of the yield curve leads to an increase in PPNR excluding trading income over time in one to five years. The result regarding one year after a fairly large parallel upward shift of 1 percentage point indicates that the PPNR excluding trading income of some regional and *shinkin* banks, assuming that they take no management actions, temporarily decreases since they have few assets coming up for interest rate renewal. However, the PPNR excluding trading income subsequently increases for all types of banks. Thus, as stated earlier, the yen IRRBB remains low, indicating that, from a somewhat longer-term perspective, a rise in interest rates will have a positive impact on banks' financial conditions when their interest rate-related assets and liabilities come up for renewal.

## 2. Interest rate pass-through to loan and deposit interest rates

This section reviews recent developments in loan and deposit interest rates and then provides an overview of factors that could potentially affect the pass-through of interest rate rises during the current phase, by referring to estimation results on the pass-through rate during the previous phase of policy rate hikes.

Following the changes in the monetary policy framework in March 2024 and the policy rate hike in July, in the loan market, the three-month TIBOR, which is the base rate for loans linked to market interest rates, has been rising moderately (left panel of Chart IV-4-7). The short-term prime rate, which is the base rate for prime rate-linked loans, after remaining unchanged until August, has been rising since September. In the deposit market, many banks raised interest rates on both

**Chart IV-4-7: Loan and deposit interest rates (compared to the previous phase of policy rate hikes)**



Note: 1. Loan rates indicate average contract interest rates on new loans and discounts (3-month backward moving averages). Deposit rates indicate the typical rates posted at banks. "LIBOR/TIBOR swap rate" indicates the LIBOR swap rate for the previous phase and the TIBOR swap rate for the current phase.  
2. The latest data for market rates, short-term prime rates, and deposit rates are as of September 2024. Those for loan rates are as of August 2024.

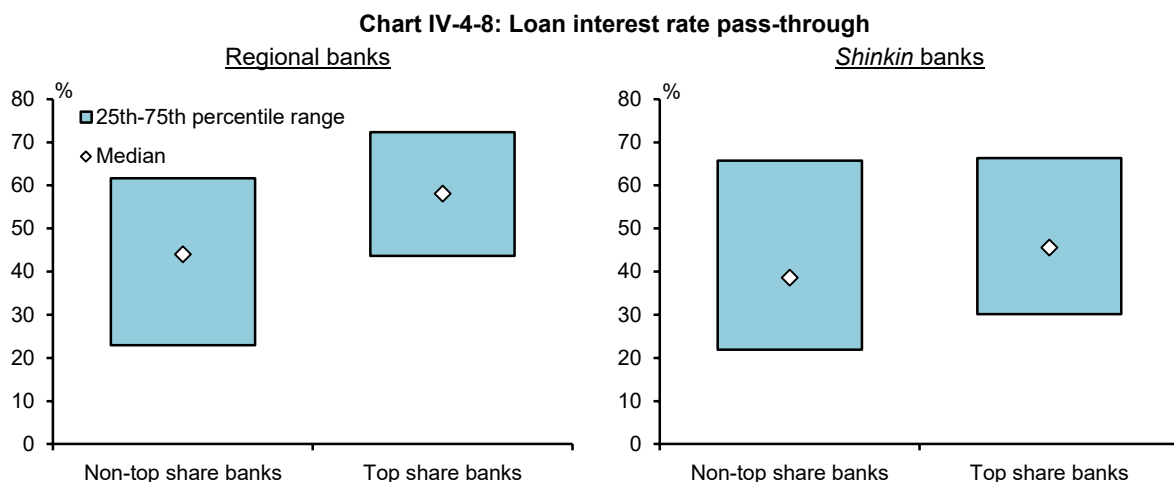
Source: Bloomberg; Haver Analytics; Ministry of Finance; BOJ.

<sup>35</sup> Interest rate pass-through rates are assumed to be as follows. For investments, the pass-through rates for loans (prime rate-linked loans, market rate-linked loans, and fixed-rate loans) and securities are 100 percent. For funding, the pass-through rates are 40 percent for demand deposits and 80 percent for time deposits. See Section C of Chapter IV in the October 2023 issue of the *Report* for the impact of the shape of the yield curve and the interest rate pass-through on banks' financial conditions.

ordinary and time deposits in April, and since the turn of September, more than 90 percent of banks have raised interest rates on ordinary deposits to around 0.1 percent (right panel of Chart IV-4-7). Although the increases in loan and deposit interest rates have been modest so far, it should be noted that there is substantial uncertainty as to whether and how banks will continue to raise loan and deposit interest rates in the future.

### Loan interest rates

Looking at developments in loan interest rates during the previous phase of policy rate hikes in 2006-2007, the policy interest rate rose by 50 basis points, while banks' average contract interest rates on new loans and discounts rose by around 30 basis points, meaning that the average pass-through rate was around 60 percent. This pass-through likely also reflects supply and demand conditions as well as the competitive environment in the loan market at the time. In fact, there were differences in pass-through rates across banks: banks falling into the top group in terms of their prefectural lending share, reflecting their greater competitiveness and larger share of market interest rate-linked loans, increased loan interest rates to a greater extent, while other banks increased them only to a relatively modest extent (Chart IV-4-8). As discussed in Section A of Chapter V below, the competitive environment in regional loan markets overall appears to be more severe during the current phase than during the previous phase of policy rate hikes, so that it may be difficult for some banks to raise loan rates to the same extent as during the previous phase.



Note: 1. Loan interest rate pass-through is calculated by dividing the change in the average contract interest rate on total new loans and discounts from the first half of 2006 to the second half of 2007 by the change in the policy rate over the same period (0.5 percentage points).

2. The share in the loan market is defined as a bank's share of total loans in their home prefecture. Top share banks are defined as banks with a high share within the same type -- i.e., banks with the highest share in their home prefecture for regional banks and banks in the top 25 percent in their home prefecture for *shinkin* banks.

Source: BOJ.

### Deposit interest rates

Looking at developments in deposit rates during the previous phase of policy rate hikes, the pass-through for ordinary deposits was about 40 percent (ordinary deposit rates rose by about 20 basis points in response to the 50 basis point increase in the policy rate) and about 80 percent for 1-year time deposits (time deposit rates rose by about 32 basis points in response to the approximately 40 basis point increase in the market rate for the corresponding maturity). However, since the pass-through to deposit rates is affected by a range of factors, such as the stickiness of retail deposits and the competitive environment, the pass-through rate during the current phase might be different from that during the previous phase. To examine this point, data on time deposit interest rates



during the previous phase of policy rate hikes are used to determine the factors affecting the pass-through rate.<sup>36</sup> The estimation results show that the higher the share of retail deposits and insured deposits (deposits up to 10 million yen), which can be regarded as an indicator of the stickiness of deposits, the lower the pass-through rate (Chart IV-4-9). Moreover, the lower the loan-to-deposit ratio and the growth in total assets, which from a bank's perspective can be regarded as investment demand, or the higher the liquid asset ratio, the lower the pass-through rate. In addition, the competitive environment in the deposit market also influences the magnitude of the pass-through rate.

**Chart IV-4-9: Estimation results of the deposit interest rate pass-through**

		Dependent variable: Time deposit rate		
		Model 1	Model 2	Model 3
Explanatory variables	Retail deposit ratio	-0.173**	—	-0.562***
	Ratio of deposits up to 10 mil. yen	—	-0.352***	—
	Herfindahl-Hirschman Index	-0.112**	-0.097*	-0.089*
	Loan-to-deposit ratio	0.297***	0.236***	—
	Total assets growth rate	0.232***	0.237***	0.250***
	Liquid asset ratio	—	—	-0.160**
	Level of the deposit rate before the policy rate hike	-0.901***	-0.894***	-0.820***
	Constant	0.704***	0.704***	0.704***
Adj. R <sup>2</sup>		0.550	0.565	0.492
Sample size		388	388	388

Note: 1. Time deposit rate is for 1-year. "Ratio of deposits up to 10 mil. yen" is the share of retail and corporate deposits up to 10 million yen (including insured current deposits regardless of the balance) among total deposits. "Herfindahl-Hirschman Index" is calculated by summing the squares of the deposit shares of all banks for each prefecture (values for each bank are calculated by taking the weighted average using their deposits by prefecture as weights). "Total assets growth rate" is the annualized growth rate from fiscal 2003 to 2005. "Liquid asset ratio" is the ratio of liquid assets (such as cash, current accounts at the BOJ, and JGBs) to deposits.

2. \*\*\*, \*\*, and \* indicate statistical significance at the 1 percent, 5 percent, and 10 percent levels, respectively.  
Source: BOJ.

Using each of these variables to examine the differences in the external environment for banks between the previous phase and the current phase of policy rate hikes shows that the shares of sticky retail deposits and insured deposits have declined, which may create more pressure to raise deposit rates during the current phase than during the previous phase (Chart IV-4-10). On the other hand, in terms of the competitive environment, market concentration (represented by the Herfindahl-Hirschman Index) in regional deposit markets has been rising, which may push down the pass-through rate. It should be noted, however, that the competitive environment has recently been changing with the rising presence of internet-only banks. Although deposit interest rates at internet-only banks differ across banks, they tend to be relatively high, and the interest rates actually applied, including preferential interest rates, often exceed the interest rates posted at these banks (Chart IV-4-11).

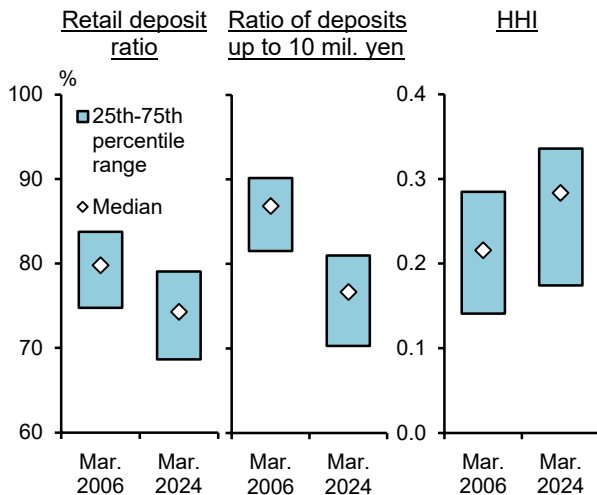
Looking at year-on-year rates of change in deposits, demand deposits have continued to increase at many banks, with no major change seen around the time of the policy rate hike (Chart IV-4-12). Moreover, the year-on-year rate of change in time deposits has remained essentially unchanged. These observations suggest that, at present, the shift between products (from demand deposits to time deposits) and between banks due to higher interest rates is limited. However, depending on developments in financial conditions, it is also possible that households' and firms' preferences with regard to asset choices may change. For example, if there is a decline in demand deposits, a large

<sup>36</sup> See Box 2 in the October 2023 issue of the *Report*. Strictly speaking, the pass-through of the policy rate is used as the dependent variable. Note that due to data constraints, the analysis focuses on interest rates on time deposits with short maturities rather than demand deposit rates.



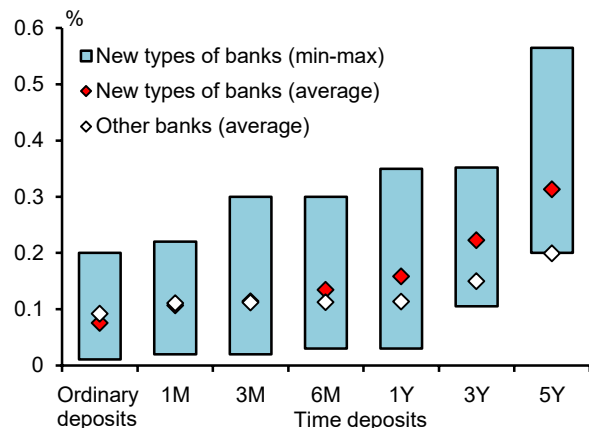
portion of which are regarded to be sticky and have a long duration, including a decline in core deposits, the duration gap between assets and liabilities may widen (Chart IV-4-13). On the other hand, under the prolonged low interest rate environment, the duration of time deposits has generally shortened, and going forward there may be a shift to time deposits with longer maturities. Banks need to adjust their amount of interest rate risk on the investment side to match their capacity to absorb losses in response to changes in the duration gap between assets and liabilities.

**Chart IV-4-10: Changes in explanatory variables**



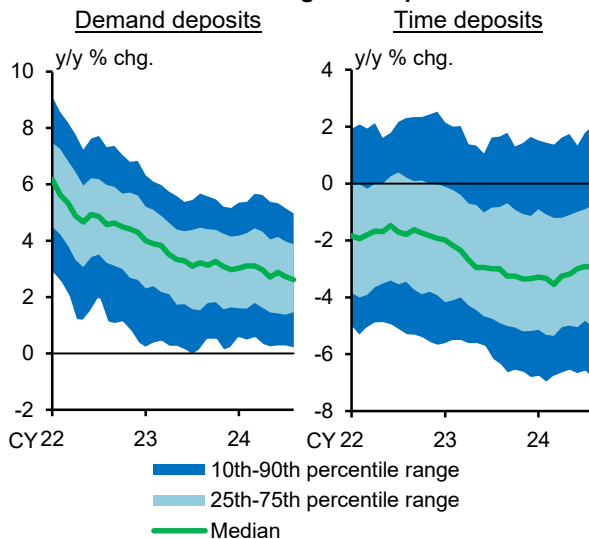
Note: HHI stands for Herfindahl-Hirschman Index.  
Source: BOJ.

**Chart IV-4-11: Deposit interest rates at new types of banks**



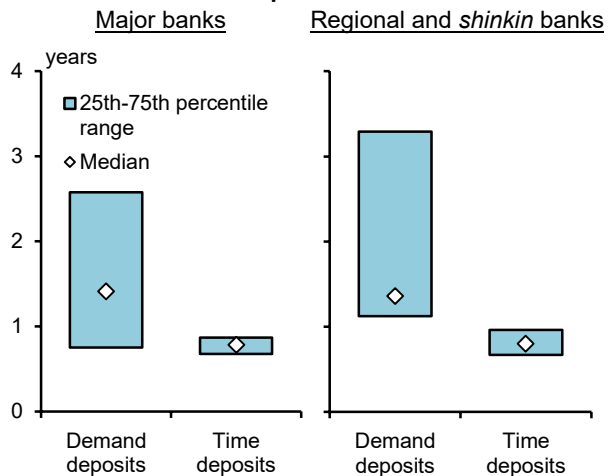
Note: Indicates the interest rates posted at banks.  
Data as of September 2024.  
Source: BOJ.

**Chart IV-4-12: Distribution of year-on-year changes in deposits**



Note: Covers regional and *shinkin* banks. Latest data as of August 2024.  
Source: BOJ.

**Chart IV-4-13: Duration of demand deposits and time deposits**



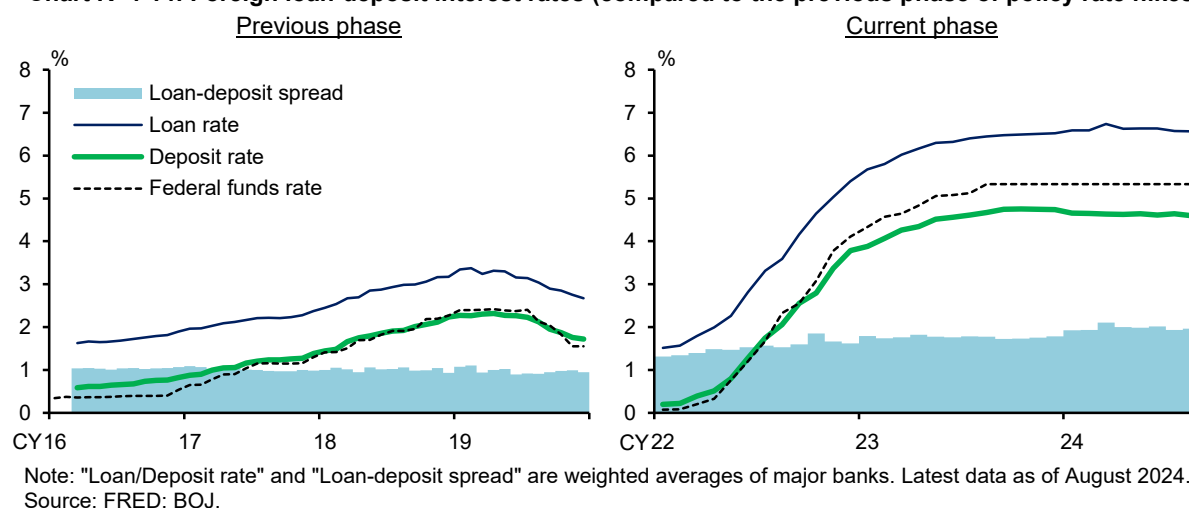
Note: Data as of end-March 2024.  
Source: BOJ.

### Foreign loan and deposit interest rates

Looking at foreign currency-denominated deposits and loans, interest rates on dollar-denominated loans at major banks, after rising in line with the substantial rise in market interest rates reflecting the majority of loans being floating-rate loans, have remained flat recently (Chart IV-4-14). While interest rates on dollar-denominated deposits at major banks have risen in a similar fashion, the

rise has been limited compared to interest rates on loans, partly because local U.S. banks have restrained the interest rate pass-through. As a result, the difference between loan and deposit interest rates, i.e., the loan-deposit spread, has been on a moderate upward trend during the current phase. While this is also reflected in the solid net interest income of major banks' international business, future developments in U.S. interest rates and their impact on the loan-deposit spread warrant attention.

**Chart IV-4-14: Foreign loan-deposit interest rates (compared to the previous phase of policy rate hikes)**



## E. Risks posed by changes in the business environment

### 1. Risks related to digital technologies

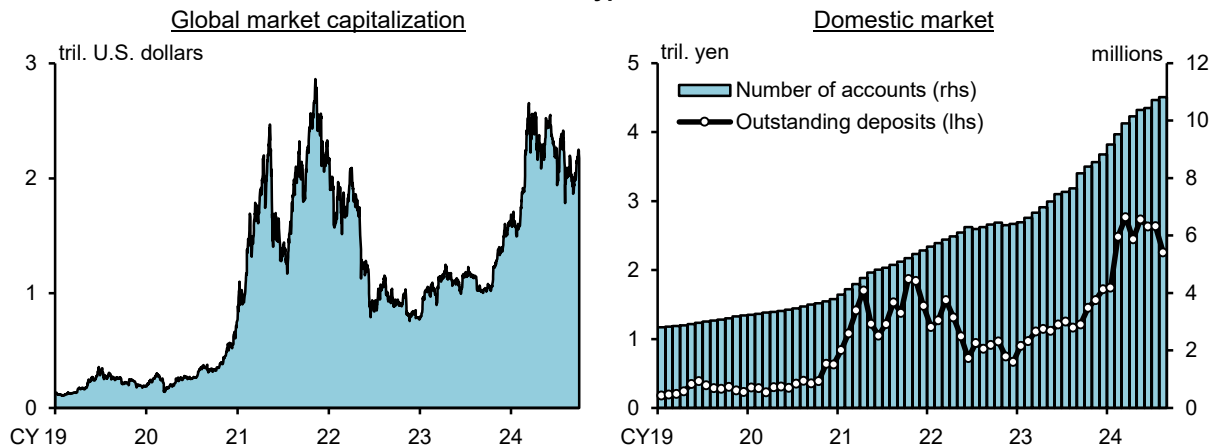
The spread of digital technologies provides banks with opportunities to improve operational efficiency and provide new financial services. At the same time, it also represents a new source of risks.<sup>37</sup> Of issues pertaining to these risks, the following describes (1) financial risks associated with cryptoasset transactions, (2) operational resilience, and (3) adaptation to new technologies.

#### *Financial risks associated with cryptoasset transactions*

The market capitalization of the global cryptoasset market rose significantly from the second half of 2023 through the start of 2024, and subsequently has been more or less unchanged, albeit with fluctuations (Chart IV-5-1). Reasons for this include growing market expectations for inflows of funds from individual and institutional investors as the U.S. Securities and Exchange Commission (SEC) has approved several cryptoasset exchange-traded funds (ETFs).<sup>38</sup> In Japan, while the size of the cryptoasset market remains limited, the range of market participants has been expanding, with the number of accounts and the outstanding amount of cryptoassets under custody at domestic exchanges being around record high levels.

<sup>37</sup> For business risks associated with digitalization, see Financial System and Bank Examination Department, "Digital Transformation of Japanese Banks," *Bank of Japan Review Series*, no. 2021-E-2, May 2021, the report on regional finance in the digital age, *Financial System Report Annex Series*, March 2021, and the report on banks' initiatives and challenges toward ensuring cybersecurity, *Financial System Report Annex Series*, January 2020 (the latter two available only in Japanese).

<sup>38</sup> The SEC approved spot Bitcoin ETFs in January 2024 and spot Ethereum ETFs in July 2024.

**Chart IV-5-1: Cryptoasset markets**

Note: Latest data for the left- and right-hand charts are as of end-September 2024 and August 2024, respectively.  
Source: Coin Dance; Japan Virtual and Crypto assets Exchange Association.

Reflecting the growing presence of cryptoassets in private transactions, financial authorities around the world have been holding discussions to implement comprehensive regulations and supervision. In October 2023, the G20 Roadmap on Crypto Assets was adopted at the G20 Finance Ministers and Central Bank Governors Meeting. Since the financial ecosystem related to cryptoassets entails complex technologies and has no geographical limitations, it is difficult to grasp the whole picture, and financial risks could materialize on an unexpected scale. It is therefore crucial for each jurisdiction to take steady actions based on international agreements. While exposures related to cryptoassets in the traditional financial system are extremely limited at this point, financial authorities have been formulating regulations concerning cryptoassets held by banks, given that the growth in banks' cryptoasset holdings could have an adverse impact on the stability of the traditional financial system.<sup>39</sup> In July 2024, the Basel Committee on Banking Supervision (BCBS) published its final disclosure framework for banks' cryptoasset exposures and released targeted amendments to its prudential standard on banks' exposures to cryptoassets.<sup>40</sup> Given Japan's strict supervisory guidelines, there are currently no banks in Japan with cryptoasset exposures that would make them subject to these standards. However, if internationally active banks increase their holdings of cryptoassets in the future, they may become subject to regulations that would be aligned with the BCBS standards.

### Operational resilience

Although the number of cyberattack cases confirmed in Japan has been small compared to the number of cases seen abroad, the number of ransomware and phishing attacks has increased (Charts IV-5-2 and IV-5-3). In addition to frontline defense measures, it is becoming increasingly important to take cybersecurity measures based on the "zero-trust" approach that assumes the intrusion of threats.

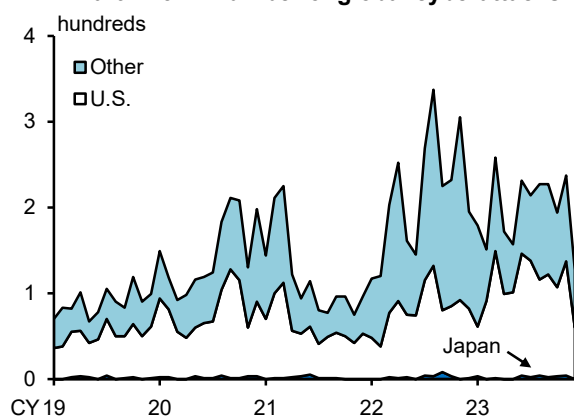
<sup>39</sup> According to the Quantitative Impact Study conducted semiannually by the BCBS, as of the first half of 2023, only 28 of the 177 surveyed banks reported exposures to cryptoassets (of which 11 banks were in the Americas and 15 banks in Europe). The share of cryptoassets held by these 28 banks in their total exposures is also limited, at around 0.013 percent.

<sup>40</sup> For details, see Basel Committee on Banking Supervision, *Disclosure of Cryptoasset Exposures*, July 2024 and Basel Committee on Banking Supervision, *Cryptoasset Standard Amendments*, July 2024. Both standards have an implementation date of January 1, 2026.

#### IV. Risks faced by financial institutions

#### E. Risks posed by changes in the business environment

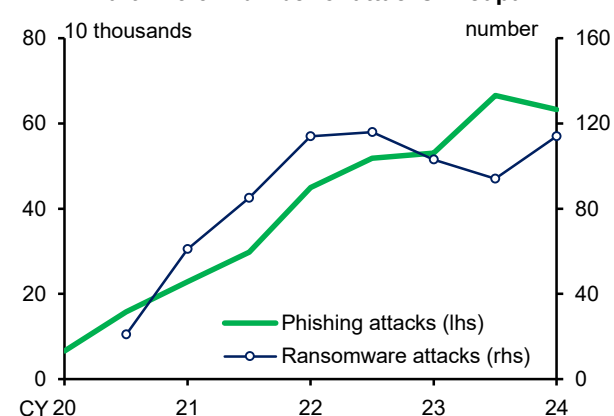
**Chart IV-5-2: Number of global cyberattacks**



Note: Latest data as of December 2023.

Source: University of Maryland CISSM Cyber Attacks Database.

**Chart IV-5-3: Number of attacks in Japan**

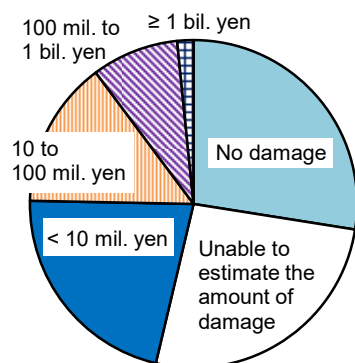


Note: Latest data as of the first half of 2024. The data for

"Ransomware attacks" start from the second half of 2020. Source: Council of Anti-Phishing Japan; National Police Agency.

According to a survey conducted of business firms in Japan in 2023, about 60 percent responded that they had experienced a cyberattack during the three-year period ending June 2023.<sup>41</sup> About half of these firms responded with the actual amount of damage; the total amount of damage in the same period was a little over 100 million yen on average, while the amount exceeded 1 billion yen at some firms (Chart IV-5-4). The distribution of losses from cyberattacks is thus characterized by a non-negligible probability of extreme losses.<sup>42</sup> It should be noted that the amount of losses is calculated as the total of (1) direct costs (the loss of business income from operational disruptions, fines and penalties, etc.), (2) recovery costs (personnel costs for the recovery of data and systems, etc.), and (3) costs to prevent the reoccurrence of cyberattacks, and that indirect costs resulting

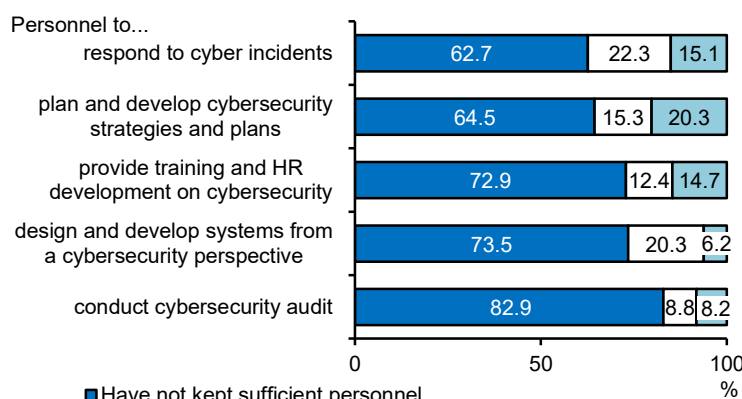
**Chart IV-5-4: Amount of damage caused by cyberattacks in Japan**



Note: Shows percentages among firms that experienced cyberattacks during the three-year period ending June 2023. The data are based on the survey conducted by Trend Micro Inc. in June 2023.

Source: Trend Micro Inc. & NPO CIO Lounge.

**Chart IV-5-5: Status of keeping cybersecurity personnel**



Note: Covers regional financial institutions. The data are based on "Cybersecurity Self-Assessment" conducted by the Bank of Japan and the Financial Services Agency in July and August 2023.

Source: BOJ & Financial Services Agency.

<sup>41</sup> The data are based on the survey conducted by Trend Micro Inc. in June 2023. Cyber risks seem to have been increasing recently as seen in incidents where banks' outsourcing partners suffered cyberattacks that resulted in the leakage of some customer information.

<sup>42</sup> The *Global Financial Stability Report* (GFSR) released by the International Monetary Fund (IMF) in April 2024 also pointed out that the distribution of losses caused by cyber incidents is heavily skewed and that the risk of extreme losses has been increasing in recent years.

from reputational damages, for example, are not included. In the case of banks, if a loss of confidence triggered by a cyberattack leads to deposit outflows and a decline in demand for funds, the losses could be far greater. These considerations highlight the necessity for banks to strengthen their cybersecurity. However, keeping cybersecurity personnel is a common challenge faced by many banks (Chart IV-5-5).<sup>43</sup>

Financial authorities worldwide have coordinated with each other to respond to the growing cybersecurity risks. In 2015, the G7 Cyber Expert Group (CEG) was established by the approval of the G7 Finance Ministers and Central Bank Governors Meeting, with a view to promoting cybersecurity in the financial sector and building partnerships among the G7 members. Members of the CEG include financial authorities from the G7 countries and the European Union. The Bank, the FSA, and the Ministry of Finance join the group from Japan. In April 2024, the CEG conducted a cross-border coordination exercise, in which the group assumed a significant cross-border cyber incident affecting the financial sector. The CEG also outlines basic topics and best practices regarding cybersecurity on which the G7 members have reached a consensus and publishes them as Fundamental Elements documents. For example, given the rising threat of ransomware on a global basis and growing dependence on third-party service providers in banks' business operations, the CEG published two Fundamental Elements documents regarding ransomware and third-party risks in 2022.<sup>44</sup> While these Fundamental Elements documents are non-binding, financial institutions and financial authorities are expected to refer to the Fundamental Elements documents to improve cybersecurity.

### *Adaptation to new technologies*

In recent years, the accelerating pace of research and practical use of new computing technologies, including digital technologies, has been transforming financial operations and creating new risks.

For example, in terms of the next generation of computers, the development of quantum computers is making progress. It has been pointed out that if quantum computers are going to be put to practical use, this would on the one hand have the potential to create financial solutions that are superior to those using existing computers; on the other hand, it could put at risk the security of public key encryption, which is currently widely used. In order to respond to this, it will be necessary to move from existing public key encryption to quantum-resistant encryption. In the past, it has taken as long as 10 years to transition to a new encryption method after the decision was made. Banks should therefore consider their responses gradually, such as identifying the encryption methods currently used in their computer systems and understanding the current status of the contents of the data protected by public key encryption.<sup>45</sup>

<sup>43</sup> For details on keeping and training cybersecurity personnel at regional and *shinkin* banks, see Financial System and Bank Examination Department, Bank of Japan, and Strategy Development and Management Bureau, Financial Services Agency, "Results of the Cybersecurity Self-Assessment for Regional Financial Institutions (FY2023)," *Financial System Report Annex Series*, forthcoming in English.

<sup>44</sup> For details, see *G7 Fundamental Elements of Ransomware Resilience for the Financial Sector*, October 2022 and *G7 Fundamental Elements for Third Party Cyber Risk Management in the Financial Sector*, October 2022. In addition, the CEG has so far published the following Fundamental Elements documents: *G7 Fundamental Elements of Cybersecurity for the Financial Sector*, October 2016, *G7 Fundamental Elements for Effective Assessment of Cybersecurity in the Financial Sector*, October 2017, *G7 Fundamental Elements for Threat-LED Penetration Testing*, October 2018, and *G7 Fundamental Elements of Cyber Exercise Programmes*, November 2020.

<sup>45</sup> In August 2024, the U.S. National Institute of Standards and Technology (NIST) released post-quantum encryption standards. Banks will need to develop plans for the transition to quantum-resistant encryption and work on the implementation of standardized algorithms.

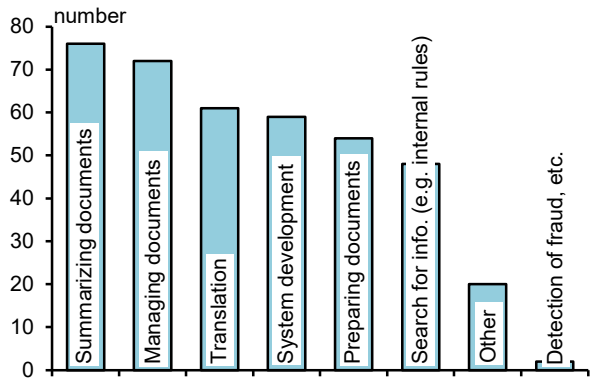
Moreover, in recent years, generative artificial intelligence (AI), which can create new content such as text and images using large language models, has rapidly penetrated society, and its use is expanding among Japanese banks (Chart IV-5-6).<sup>46</sup> Large language models are a representation of relationships between words and phrases that uses deep learning of a large database of texts. As with ordinary numerical computation, the models can quantify and compute the relationships between words and phrases. Generative AI uses the large language models to generate texts and images that are predicted to be most relevant to the input texts. According to a survey conducted by the Bank, approximately 30 percent of banks surveyed, including major, regional, and *shinkin* banks, are already using generative AI, and when banks testing the technology are included, the figure rises to about 60 percent.<sup>47</sup> Looking at the fields in which generative AI is used, many banks are currently using it to improve operational efficiency, for example, by using it for the summarization, proofreading, and translation of documents (Chart IV-5-7). Due to the nature of their business, banks handle large volumes of information, so they may benefit substantially from improved labor productivity.

Chart IV-5-6: Applicability and risks of generative AI usage among financial institutions

	Data processing	Operation
Applicability	Text analysis	Summarizing/revising documents
	Preparation/review of documents	Translation
	Customer relations	System operation management
Risk	Hallucination	Unauthorized use of prompts
	Ethical bias	Leakage of confidential info.
	Blackbox	Infringement of copyrights, etc.

Note: For details, see "Use and Risk Management of Generative AI by Japanese Financial Institutions -- Based on the results of questionnaire survey --," *Financial System Report Annex Series*, forthcoming in English.  
Source: BOJ.

Chart IV-5-7: Areas of generative AI usage



Note: The data are based on "Survey on the Artificial Intelligence Usage" conducted by the Bank of Japan in April and May 2024. Covers banks that are either currently using or testing generative AI. "Managing documents" indicates revision, proofreading, and assessment of documents. "System development" also entails operation management.  
Source: BOJ.

On the other hand, banks also need to be fully aware of the risks posed by generative AI (Chart IV-5-6). For instance, it is not easy to ensure explainability of prediction outputs by the large language models because the models are large and complex. It is also known that there is a risk that generative AI may respond with some kind of bias or "hallucinate" -- i.e., provide non-factual answers to users' questions -- as the prediction depends on the contents of databases used to build the models and characteristics of deep learning methods. As a countermeasure to such risk, banks need to involve human judgment in evaluating the answers generated by AI instead of blindly relying on them. Moreover, since generative AI is generally provided on a cloud service, information

<sup>46</sup> For details on channels through which generative AI improves productivity in the economy and its potential, see, for example, Filippucci, F., Gal, P., Jona-Lasinio, C., Leandro, A., and Nicoletti, G., "The Impact of Artificial Intelligence on Productivity, Distribution and Growth: Key Mechanisms, Initial Evidence and Policy Challenges," OECD Artificial Intelligence Papers, No.15, April 2024. Moreover, regarding the impact on the financial sector and implications for financial stability, see Bank for International Settlements, "Artificial Intelligence and the Economy: Implications for Central Banks," BIS Annual Economic Report, Chapter III, June 2024.

<sup>47</sup> For details on the use of AI and risk management at Japanese banks, see "Use and Risk Management of Generative AI by Japanese Financial Institutions -- Based on the results of questionnaire survey --," *Financial System Report Annex Series*, forthcoming in English.



input by banks could be used to train generative AI, potentially leading to unintended information leakage. To avoid such risks, banks need to take measures such as establishing rules to prevent the input of confidential information into generative AI and requiring service providers and developers not to use input information in generative AI. Thus, in promoting the use of generative AI, banks need to establish operating rules that take the risks specific to generative AI into account. Moreover, as generative AI becomes more widespread, attention should be paid to an increase in new types of cyberattacks, such as using prompt injections (methods that cause malfunctions in the system by giving malicious instructions and commands to generative AI).

## 2. Climate-related financial risks

Climate change could affect the stability of the financial system through physical and transition risks -- i.e., climate-related financial risks. Financial institutions therefore need to grasp the impact of climate change in a forward-looking manner. Financial authorities and financial institutions in Japan and abroad are pushing ahead with initiatives to quantitatively assess climate-related financial risks using scenario analysis. Employing scenarios covering the period up to 2050, there have been many attempts to understand the impact of physical risks in the absence of decarbonization efforts and the impact of the process of transition to a decarbonized society and economy.<sup>48</sup> Following these initiatives, financial institutions are becoming mindful of the importance of understanding the financial impact of significant adjustments that could occur in the short term -- for example, natural disasters on an unprecedented scale and significant changes in market participants' perceptions of risks concerning climate change.<sup>49</sup> In Japan, the Bank and the FSA conducted a pilot scenario analysis exercise with major financial institutions in 2021, and since then have exchanged opinions with financial institutions to continuously improve the analytical methods and framework.<sup>50</sup> In May 2024, the Bank and the FSA announced that they were preparing to conduct a scenario analysis in cooperation with major banks, with a view to grasping transition risks within a shorter time frame than the one that was used in the pilot exercise in 2021.<sup>51</sup>

While developments in climate-related loans and investments in Japan, especially green finance, have been relatively weak since the start of 2024, transition finance, which supports steady decarbonization, has remained on an uptrend (Chart IV-5-8).<sup>52</sup> Climate-related loans to SMEs have increased in addition to loans to large firms, which started to increase earlier, and the lineup of lenders has expanded from major banks to regional banks (Chart IV-5-9).

As more banks are committing to greenhouse gas emission targets, they have taken a wide range of initiatives to realize these targets, including developing organizational structures and medium- to long-term transition plans and providing support for their clients' responses to climate change. With regard to addressing climate change issues related to the financial system, the Bank will also

<sup>48</sup> See, for example, Financial Stability Board and Network for Greening the Financial System, *Climate Scenario Analysis by Jurisdictions: Initial Findings and Lessons*, November 2022.

<sup>49</sup> Against this background, the Network for Greening the Financial System has also indicated that it intends to begin developing short-term scenarios. For details, see Network for Greening the Financial System, *Conceptual Note on Short-Term Climate Scenarios*, October 2023.

<sup>50</sup> For details, see Financial Services Agency and Bank of Japan, *Pilot Scenario Analysis Exercise on Climate-Related Risks Based on Common Scenarios*, August 2022.

<sup>51</sup> For details, see *Climate-Related Scenario Analysis -- Next Step in the Banking Sector* -- on the Bank's website.

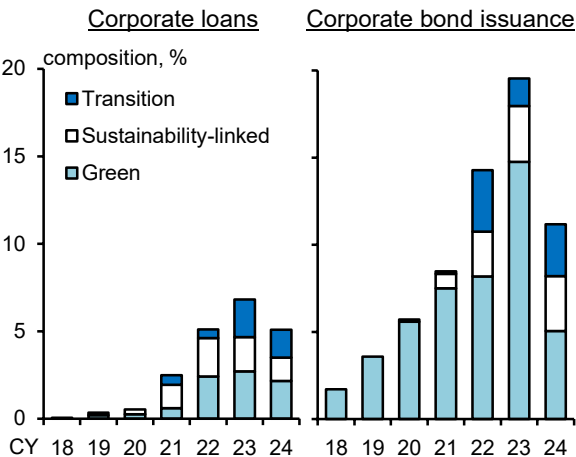
<sup>52</sup> Typical examples of climate-related loans and investments include (1) green finance, i.e., financing for projects that contribute to decarbonization, (2) sustainability-linked finance, i.e., financing for entities that are engaged in initiatives that contribute to decarbonization, and (3) transition finance, i.e., financing where the use of funds and the initiatives of entities contribute to steady decarbonization.



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push ahead with various measures. Among them, the Bank will conduct research and analysis, as well as engage in in-depth dialogue with banks regarding (1) the identification and management of climate-related financial risks, (2) measures to enhance the quality and quantity of disclosure, and (3) engagement with corporate customers in pursuit of decarbonization. Moreover, the Bank will encourage banks to develop their climate scenario analyses in line with their size and characteristics, taking into account international discussions on regulations, supervision, and risk management related to climate-related financial risks.

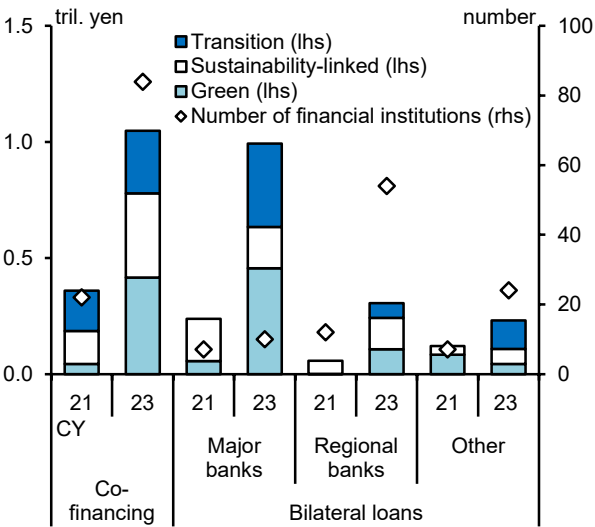
Chart IV-5-8: Climate-related loans and investments by type



Note: The left-hand chart shows the share of climate-related corporate loans among the amount of new loans for fixed investments. The right-hand chart shows the share of climate-related corporate bonds among the issuance amounts of publicly-offered domestic bonds. Latest data as of the first half of 2024.

Source: JPX Market Innovation & Research, Inc., "ESG Bond Information Platform"; JSDA; Ministry of Economy, Trade and Industry; Ministry of the Environment; Published accounts of individual companies; BOJ.

Chart IV-5-9: Climate-related loans by lender



Note: "Number of financial institutions" for "Co-financing" indicates the number of deals.

Source: Ministry of Economy, Trade and Industry; Ministry of the Environment; Published accounts of individual companies.

## V. Resilience of the financial system

- Looking at banks' loss-absorbing capacity shows that the capital of major banks, regional banks, and *shinkin* banks well exceeds regulatory requirements. Their profitability as a whole has remained on an improving trend over the past few years. It should be noted, however, that factors such as the structural decline in domestic loan demand have continued to exert downward pressure on profitability in recent years.
- Given banks' loss-absorbing capacity, macro stress testing is conducted under two downside scenarios: a "rises in foreign interest rates" scenario, which assumes foreign interest rates remain higher for longer, and a "financial stress" scenario, which assumes stress similar to the global financial crisis.
- Based on the results of the macro stress testing, it can be judged that the stability of Japan's financial system is maintained even under these stress events. However, even if banks have sufficient capital to withstand a one-time shock, some may need a certain amount of time to restore their capital once it is impaired. Banks need to be prepared to appropriately manage a variety of risks, including risks arising from the stress assumed in the macro stress testing.

### A. Banks' capacity to absorb losses

Ahead of the macro stress testing in the next section, this section examines banks' loss-absorbing capacity from various perspectives.

#### 1. Capital adequacy and loss-absorbing capacity

##### *Profit buffers*

Banks' net income has remained on an uptrend (Chart V-1-1).<sup>53</sup> Losses such as credit costs have been limited, and pre-provision net revenue (PPNR) excluding trading income, which shows banks' core profitability, has continued to improve. On the back of the improvement in PPNR excluding trading income, break-even credit cost ratios (PPNR excluding trading income/loans outstanding) have also improved (Chart V-1-2).<sup>54</sup>

Cost-cutting efforts -- including the consolidation of branch networks and reductions in personnel expenses -- have contributed to the recent improvement in banks' profits. However, most recently, overhead costs have been pushed up by increases in non-personnel expenses, including costs related to investment in computer systems, as well as increases in personnel expenses, especially among major banks (Charts V-1-3 and V-1-4). Moreover, given the increasing labor shortages in the economy as a whole, banks are also experiencing growing personnel shortages. In particular, securing specialized personnel in the fields of market operations and cybersecurity is regarded as a major management issue for banks (Chart V-1-5). Banks need to make efforts to increase productivity per employee -- for example by increasing capital equipment through investment in

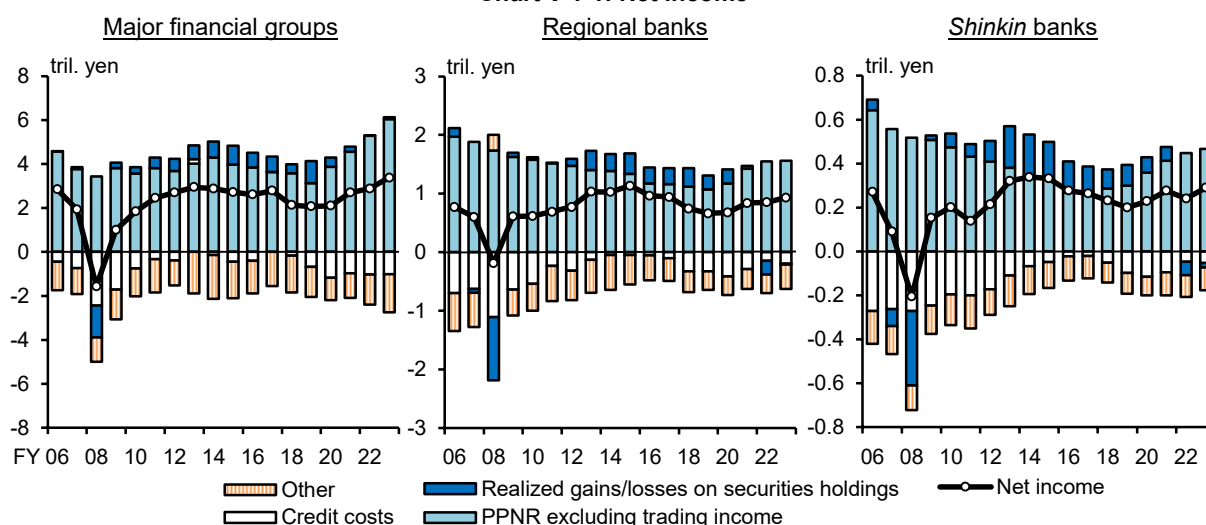
<sup>53</sup> For details on banks' financial results for fiscal 2023, see "Financial Results of Japan's Banks for Fiscal 2023," *Financial System Report Annex Series*, September 2024.

<sup>54</sup> The break-even credit cost ratio represents credit costs that can be absorbed by PPNR excluding trading income in a single fiscal year, relative to loans outstanding. The higher the ratio, the greater banks' capacity to absorb losses and the ratio captures their short-term loss-absorbing capacity on a flow basis (i.e., on the basis of their profits).

V. Resilience of the financial system  
A. Banks' capacity to absorb losses

digital resources -- and to select and focus on priority areas in order to make effective use of limited business resources so as to improve their core profitability.

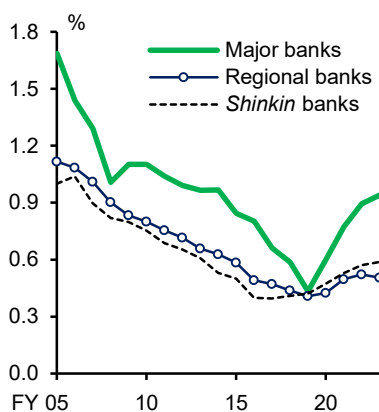
**Chart V-1-1: Net income**



Note: 1. From fiscal 2012, profits and losses from investment trusts due to cancellations are excluded from "PPNR excluding trading income" and included in "Realized gains/losses on securities holdings."  
2. Major financial groups cover Mizuho Financial Group, Mitsubishi UFJ Financial Group, Resona Holdings, Sumitomo Mitsui Trust Group, SBI Shinsei Bank, and Aozora Bank.  
3. Latest data as of fiscal 2023.

Source: Published accounts of individual banks; BOJ.

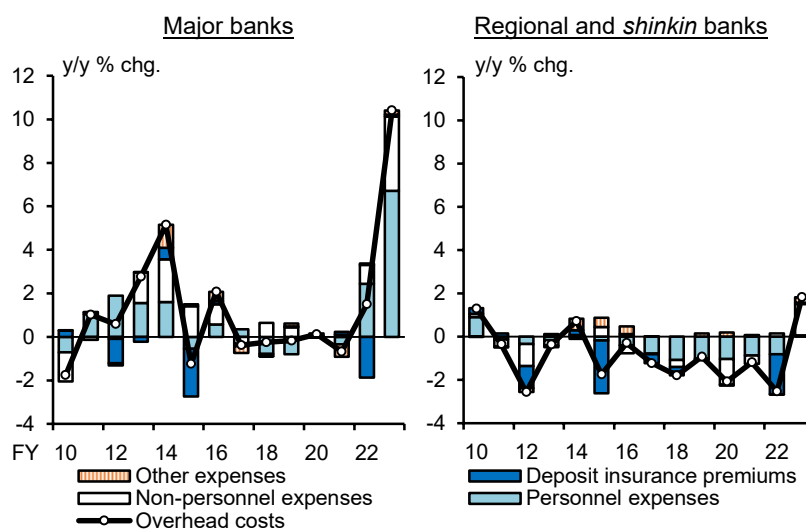
**Chart V-1-2: Break-even credit cost ratios**



Note: "Break-even credit cost ratios" is the ratio at which credit costs equal PPNR excluding trading income (excluding profits and losses from investment trusts due to cancellations from fiscal 2012). Latest data as of fiscal 2023.

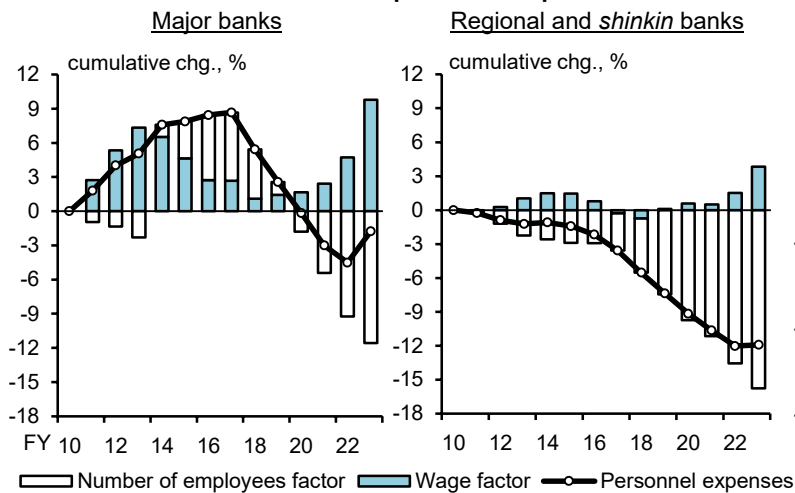
Source: BOJ.

**Chart V-1-3: Banks' overhead costs**

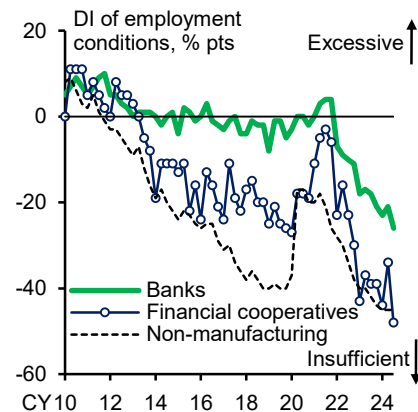


Note: Data based on domestic and foreign branches. "Non-personnel expenses" excludes deposit insurance premiums. Latest data as of fiscal 2023.

Source: BOJ.

**Chart V-1-4: Banks' personnel expenses**

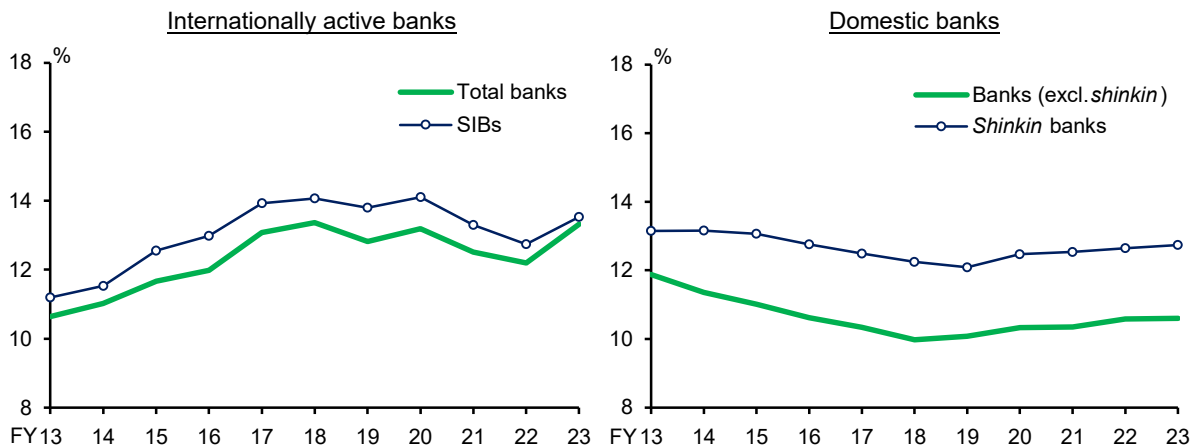
Note: 1. The data for major banks are based on domestic branches, and those for regional and shinkin banks are based on domestic and foreign branches.  
 2. Shows cumulative changes from fiscal 2010. Wages are calculated by dividing personnel expenses by the average number of employees.  
 3. Latest data as of fiscal 2023.  
 Source: BOJ.

**Chart V-1-5: Banks' employment conditions**

Note: Latest data as of September 2024.  
 The data for "Non-manufacturing" are for all enterprises.  
 Source: BOJ.

## Capital

Banks have maintained sufficient capital. In fiscal 2023, both the common equity Tier 1 (CET1) capital ratio of internationally active banks and the core capital ratio of domestic banks substantially exceeded the regulatory requirements (Chart V-1-6).<sup>55,56</sup> Banks have sufficient capital bases overall, which will enable them to continue with risk-taking.

**Chart V-1-6: Capital adequacy ratios**

Note: 1. The left-hand chart shows the CET1 capital ratio; the right-hand chart shows the core capital ratio. In principle, on a banking group basis.  
 2. Latest data as of end-March 2024.

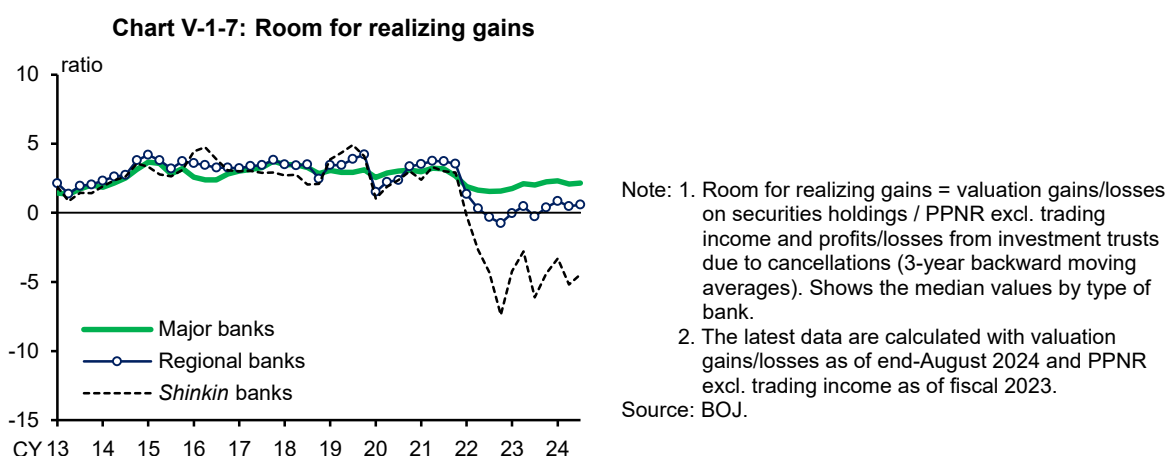
Source: Published accounts of individual companies; BOJ.

<sup>55</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, including 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 of 1 to 2.5 percent for global systemically important banks (G-SIBs) or 0.5 percent for domestic systemically important banks (D-SIBs).

<sup>56</sup> The CET1 capital ratio of internationally active banks in fiscal 2023 was higher than in the previous fiscal year due to an increase in valuation differences on available-for-sale securities reflecting the rise in stock prices and a decrease in risk-weighted assets at some banks as a result of the finalization of Basel III.

Some regional banks adopted the finalized Basel III regulations early, from end-March 2023. Moreover, internationally active banks and domestic banks that use the internal models approach started to apply the regulations from end-March 2024, while the remaining banks, i.e., domestic banks that use the standardized approach, will start applying them from end-March 2025. In the finalized package of the regulations, there are factors that increase capital adequacy ratios, such as the lower risk weight for corporate exposures, while there are also factors that decrease those ratios, such as the introduction of the output floor and the higher risk weight for stockholdings. That said, banks will likely be able to address the change without delay, as the output floor and the risk weight will be raised in a phased manner.<sup>57</sup>

Valuation gains/losses on securities holdings, which are not included in the regulatory capital for domestic banks, can function as a capital buffer when taking valuation gains/losses on all investment securities into account. Although stockholdings have registered growing valuation gains, bondholdings have registered rising valuation losses in recent years (Chart IV-2-1). As a result, the "room for realizing gains" -- defined as valuation gains/losses on securities holdings (including strategic stockholdings and excluding held-to-maturity securities) divided by the past average of PPNR excluding trading income -- has remained below the average seen before the pandemic. In fact, it remains negative for *shinkin* banks, for which stocks account for a small share of assets and yen-denominated bonds account for a large share of assets (Chart V-1-7).



Looking at banks' loss-absorbing capacity overall, their capital exceeds regulatory requirements, and their profit buffers have improved. However, room for realizing gains on securities holdings, which can be used to offset losses in a relatively flexible manner, varies across types of banks.

## 2. Banks' profitability

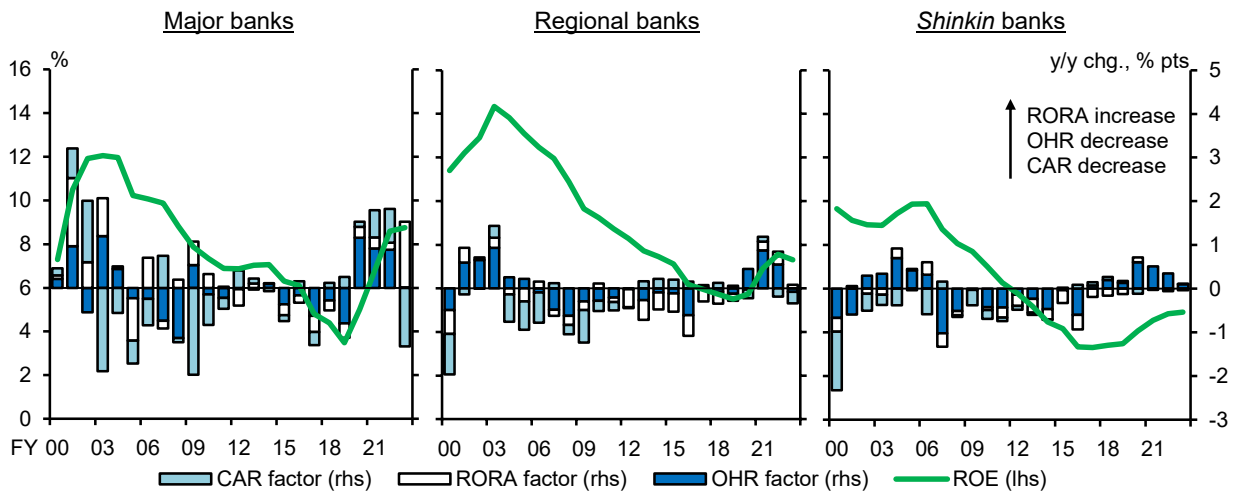
As noted above, banks' net income has remained on an uptrend. While banks' return on equity (ROE) based on PPNR excluding trading income had also been rising in recent years, mainly due to improvements in their overhead ratios (OHRs) (= overhead costs/gross operating profits), which represent operating efficiency, in fiscal 2023, their ROE remained flat as the improvement in OHRs stalled (Chart V-1-8).<sup>58</sup> Meanwhile, the growth in banks' return on risk-weighted assets (RORA),

<sup>57</sup> The output floor will be increased from the initial 50 percent to 72.5 percent. The risk weight for stockholdings will be increased from the initial 100 percent to 250 percent.

<sup>58</sup> In Chart V-1-8, changes in ROE based on PPNR excluding trading income are decomposed into the contribution of (1) the RORA factor (gross operating profits from core business excluding trading income/risk-weighted assets), (2) the OHR factor (PPNR excluding trading income/gross operating profits from core business excluding trading

which shows their investment efficiency, continued to be limited, particularly for regional and *shinkin* banks.<sup>59</sup>

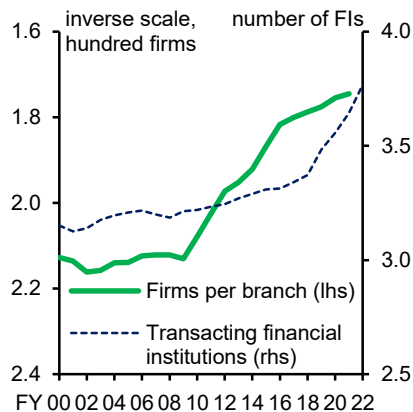
**Chart V-1-8: ROE based on PPNR excluding trading income**



Note: From fiscal 2012, profits and losses from investment trusts due to cancellations are excluded. Latest data as of fiscal 2023. Source: BOJ.

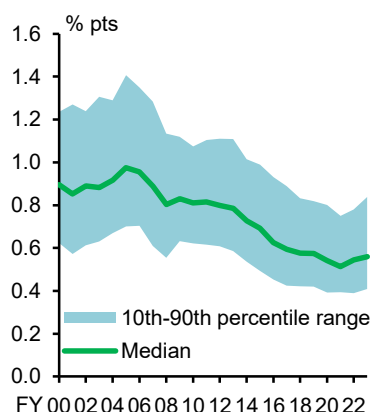
The long-term decline in regional and *shinkin* banks' RORA can be attributed to structural factors, such as the decline in the potential growth rate reflecting the shrinking population and the consequent decline in domestic loan demand and the prolonged low interest rate environment that has persisted to date. Under the prevailing downward pressure on profits, regional and *shinkin* banks have sought to secure profits by being active in risk-taking, such as lending to middle-risk firms, lending to the real estate industry, and cross-prefecture lending, but this has resulted in

**Chart V-1-9: Competition among financial institutions**



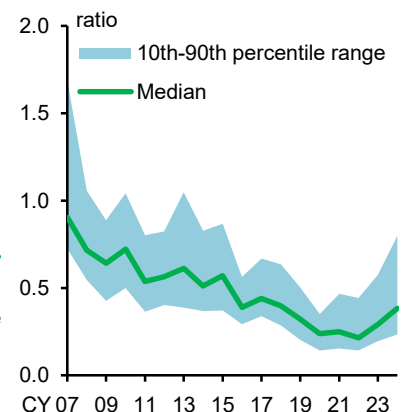
Note: 1. "Transacting financial institutions" covers those for SMEs.  
2. The latest data for "Firms per branch" are as of fiscal 2021 and those for "Transacting financial institutions" are as of fiscal 2022.  
Source: Ministry of Internal Affairs and Communications; Teikoku Databank; BOJ.

**Chart V-1-10: Markup among regional and *shinkin* banks**



Note: Covers regional banks (domestic business) and *shinkin* banks. The estimation period is from fiscal 1983 to 2023. Latest data as of fiscal 2023.  
Source: BOJ.

**Chart V-1-11: P/B ratios of listed banks**



Note: Data as of end-March for each year. Latest data as of end-March 2024.  
Source: S&P Global Market Intelligence.

income), and (3) the CAR factor (the inverse of the capital adequacy ratio).

<sup>59</sup> While the RORA factor made a large positive contribution to major banks' ROE based on PPNR excluding trading income in fiscal 2023, since, for some banks, risk-weighted assets decreased due to the impact of the finalization of Basel III, the CAR factor made a negative contribution.

increased lending competition (Chart V-1-9). Against this background, a look at regional and *shinkin* banks' markups (which are one indicator of the degree of competition) shows that these have been on a downward trend since the mid-2000s and are still at historically low levels, confirming a picture of intensifying competition that is pushing down profits (Chart V-1-10).<sup>60</sup> Moreover, looking at listed banks' price-to-book (P/B) ratios, which are considered to reflect their profitability, the median P/B ratio has generally remained below 0.5 since 2010. Although P/B ratios have been rising recently, especially for major banks, due to the possibility of higher interest rates, they are still below one for most banks (Chart V-1-11). Under these circumstances, it is desirable for banks to formulate their capital policies, including policies on profit distribution, taking the balance between profitability and loss-absorbing capacity over a somewhat longer time horizon into account.

## B. Macro stress testing

This section examines comprehensively whether banks have sufficient loss-absorbing capacity using macro stress testing assuming specific stress events.<sup>61,62</sup>

In this *Report*, the stress testing assumes two downside scenarios: a "rises in foreign interest rates" scenario, and a "financial stress" scenario. The rises in foreign interest rates scenario assumes rises in foreign interest rates against the background of increasing raw material costs at home and abroad, triggered by geopolitical or other exogenous events, and slowdowns in foreign economies. While this scenario is similar to the "inverted yield curve" scenario examined in previous *Reports*, the scenario in this *Report* differs in that foreign interest rates are assumed to rise more as the risk of interest rates remaining higher for longer is incorporated into long-term interest rates.<sup>63</sup> The financial stress scenario assumes stress of the same magnitude as that observed at the time of the global financial crisis, and has been examined regularly.

Moreover, while Chapter IV examined the impact of changes in the interest rate environment on firms and banks based on certain assumptions, this section, using the model employed for macro stress testing, conducts a sensitivity analysis assuming a 1 percentage point parallel upward shift from the baseline scenario in yen interest rates only.

The downside scenarios and assumptions used for the sensitivity analysis of a yen interest rate shift are hypothetical and designed to effectively examine the resilience of the financial system. 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>60</sup> For the method of calculating markups, see the report on intensified competition among regional and *shinkin* banks and financial stability by Ojima, M. The Japanese version, released in December 2017, is available as Bank of Japan Working Paper, no. 17-J-9.

<sup>61</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 Abe, N., Chikamatsu, K., Kanai, K., Kawasumi, Y., Munakata, K., Nakayama, K., Okuda, T., and Takano, Y., "The Financial Macro-econometric Model (FMM, 2022 Version)," *BOJ Reports & Research Papers*, March 2023.

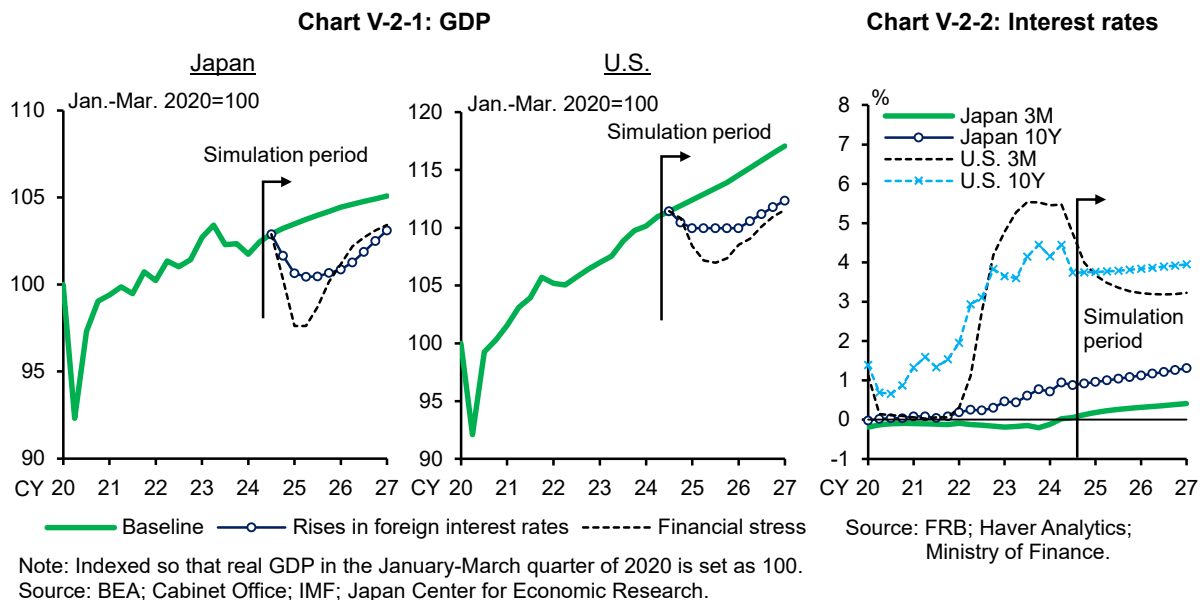
<sup>62</sup> The stress testing targets 109 banks and 247 *shinkin* banks. The simulation period is from the April-June quarter of 2024 through the January-March quarter of 2027. For the main economic and financial variables and simulation results of the assumed scenarios, refer to the "Scenario Tables" on the Bank's website.

<sup>63</sup> In the previous *Report*, it was assumed that the U.S. policy interest rate is 2 percentage points higher than in the baseline scenario, and the interest rates for other maturities were assumed to be formed in line with the pure expectations hypothesis and to move in a manner consistent with developments in policy rates. In addition to the assumption made in the previous *Report*, this *Report* also assumes that long-term interest rates are 1 percentage point higher than in the baseline scenario. Moreover, crude oil prices are assumed to increase to a larger extent than in the previous *Report*, rising to the peak seen before the global financial crisis.



## 1. Baseline scenario

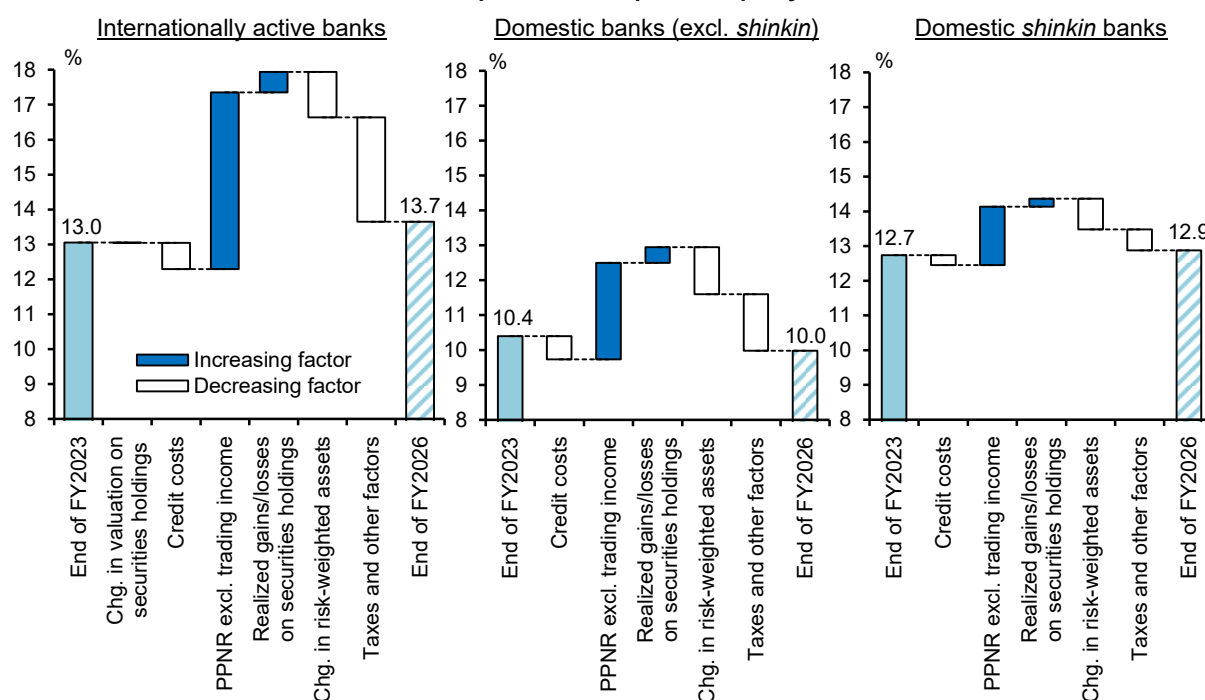
The baseline scenario assumes that Japan's economy keeps growing with foreign economies continuing to grow moderately, based on average forecasts by several research institutions and market expectations as of September 2024 (Chart V-2-1).<sup>64</sup> As for financial variables, it is assumed that all of the currently available information on the outlook for the domestic and foreign economies is appropriately priced in by financial markets. The baseline scenario assumes that market interest rates rise moderately in Japan and decline moderately overseas in line with the forward rate curve in late September 2024 (Chart V-2-2). It is assumed that other financial variables (stock prices, crude oil prices, exchange rates, and various credit spreads) are unchanged from their levels in late September 2024. There are no significant differences from the growth rates of the domestic and foreign economies assumed in the baseline scenario in the previous issue of the *Report*. Long-term domestic interest rates at the end of the simulation period are assumed to be about 0.2 percentage points higher than those assumed in the previous *Report*.



The simulation results indicate that capital adequacy ratios at the end of fiscal 2026 -- the end of the simulation period -- are sufficiently above the regulatory requirements for all types of banks (Chart V-2-3). One factor boosting capital is the cumulative increase in PPNR excluding trading income as a result of the recovery of the economy. At the same time, taxes and other factors, as well as changes in risk-weighted assets, make a negative contribution, reflecting that greater profits give rise to greater tax and dividend payments and that the recovery of the economy leads to a rise in loans outstanding, hence a rise in risk-weighted assets.

<sup>64</sup> Of the policy measures implemented since the start of the pandemic, as in previous issues of the *Report*, the baseline scenario assumes that zero-zero loans will decline by 5 percent every quarter. Specifically, it is assumed that firms start to pay interest from fiscal 2023, which lowers their ICRs. The same assumptions are made in the two downside scenarios.

**Chart V-2-3: Decomposition of capital adequacy ratio: Baseline**



Note: 1. Indicates the contribution of each factor to the difference between the capital adequacy ratios at end-fiscal 2023 and the end of the simulation period (as of end-fiscal 2026) 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 banks.

## 2. Rises in foreign interest rates scenario

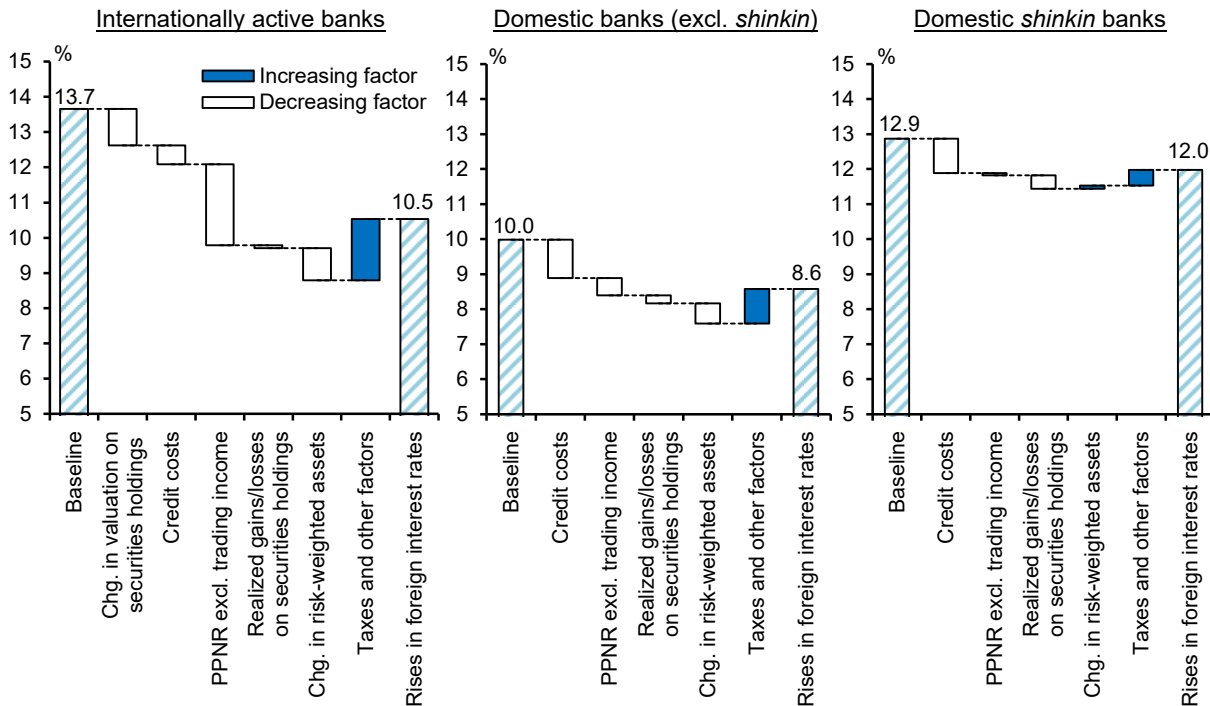
The rises in foreign interest rates scenario uses the same assumptions as the inverted yield curve scenario in the previous *Report*, but additionally assumes a rise in foreign long-term interest rates and a resurgence in raw material costs on a global basis. Specifically, as in the previous issue of the *Report*, it is assumed that the U.S. federal funds rate is 2 percentage points higher than in the baseline scenario from the October-December quarter of 2024 and remains high for one year before decreasing moderately toward the end of the simulation period. U.S. long-term interest rates are assumed to be 1 percentage point higher than in the baseline scenario and remain high, and it is assumed that interest rates for all maturities rise. Similarly, interest rates for all maturities in Europe are assumed to remain elevated, like those in the United States.

Turning to the real economy, both the U.S. and European economies are assumed to decelerate against the background of rises in raw material costs and interest rates (Chart V-2-1). The growth rate of the U.S. economy is assumed to turn slightly negative in the second half of fiscal 2024 and remain zero thereafter for one year. It is assumed that crude oil prices rise to the peak marked before the global financial crisis, and prices of risky assets fall as the real economy deteriorates. In the model, Japan's economy slows down endogenously due to the deterioration in foreign economies and in the terms of trade due to a rise in raw material costs.

The simulation results indicate that capital adequacy ratios at the end of fiscal 2026 are lower than in the baseline scenario for all types of banks (Chart V-2-4). First, the ratios are pushed down by a decrease in foreign net interest income (decline in PPNR excluding trading income) due to rising foreign currency funding costs. The decline is particularly pronounced among internationally active banks. In addition, credit costs increase for all types of banks due to a deterioration in corporate profits through rising raw material costs. Moreover, the assumption of higher long-term foreign interest rates means that valuation losses on securities holdings at internationally active banks are

greater than those in the inverted yield curve scenario in the previous *Report*. However, capital adequacy ratios overall remain above the regulatory requirements throughout the simulation period. It can be judged that the stability of the financial system as a whole is maintained even with foreign interest rates remaining higher for longer.

**Chart V-2-4: Decomposition of capital adequacy ratio: Rises in foreign interest rates**



Note: Indicates the contribution of each factor to the difference between the capital adequacy ratios at the end of the simulation period (as of end-fiscal 2026) under the baseline scenario and the rises in foreign interest rates scenario.

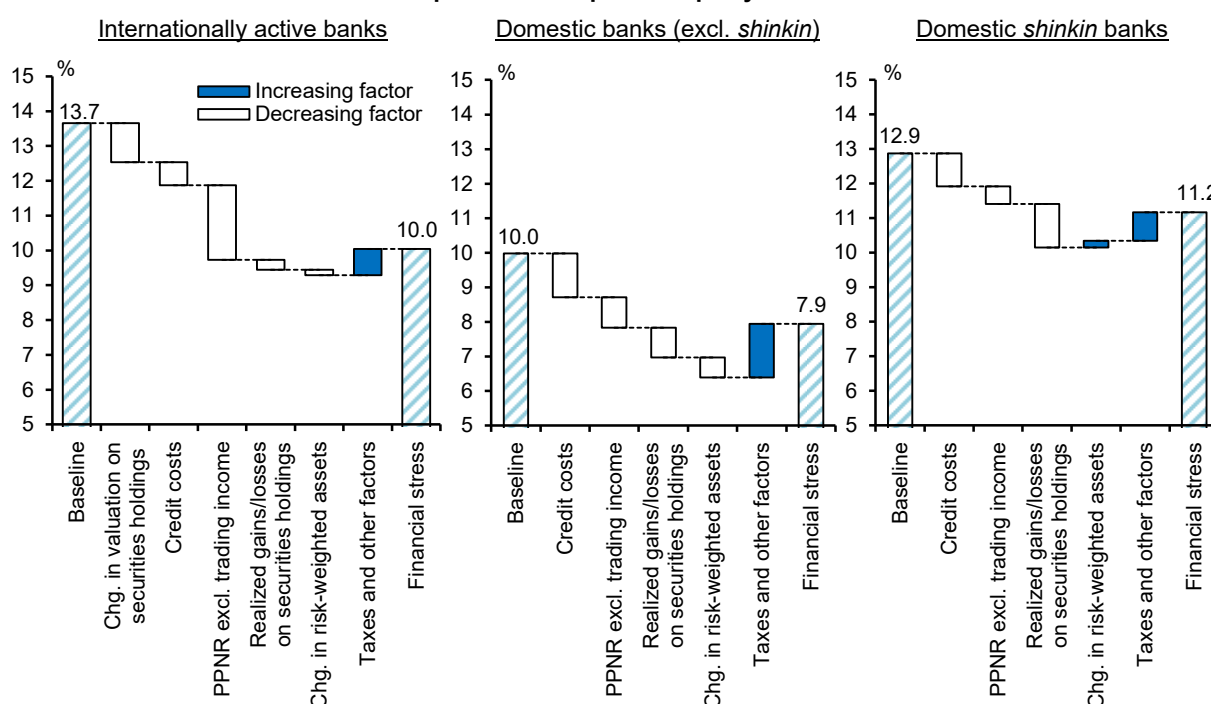
### 3. Financial stress scenario

The financial stress scenario assumes that global financial markets experience a negative shock in the October-December quarter of 2024 comparable to that during the global financial crisis. Regarding financial variables, it is assumed that, with prices of risky assets plummeting and domestic and foreign interest rates declining to record low levels, the yen appreciates in foreign exchange markets.<sup>65</sup> In addition, Japan's economy decelerates endogenously in the model, reflecting the substantial repricing in financial markets and a slowdown in foreign economies similar to that seen during the global financial crisis.

The simulation results indicate that capital adequacy ratios at the end of fiscal 2026 are substantially lower than in the baseline scenario (Chart V-2-5). The decrease in capital adequacy ratios reflects a decline in interest margins due to the fall in interest rates (decline in PPNR excluding trading income), an increase in credit costs resulting from the economic downturn, and a decline in the prices of risky assets (a deterioration in both valuation and realized gains/losses on securities holdings). Nevertheless, capital adequacy ratios remain above regulatory levels on average for all types of banks, despite differences in the size of decline in the ratios. It can therefore be assessed that banks have sufficient capital to withstand such substantial and acute stress.

<sup>65</sup> Regarding U.S. corporate bonds and securitized products, it is assumed that the pass-through rate of spreads on low-rated bonds to spreads on high-rated bonds rises to the same level as at the time of the market turmoil in March 2020.

**Chart V-2-5: Decomposition of capital adequacy ratio: Financial stress**



Note: Indicates the contribution of each factor to the difference between the capital adequacy ratios at the end of the simulation period (as of end-fiscal 2026) under the baseline scenario and the financial stress scenario.

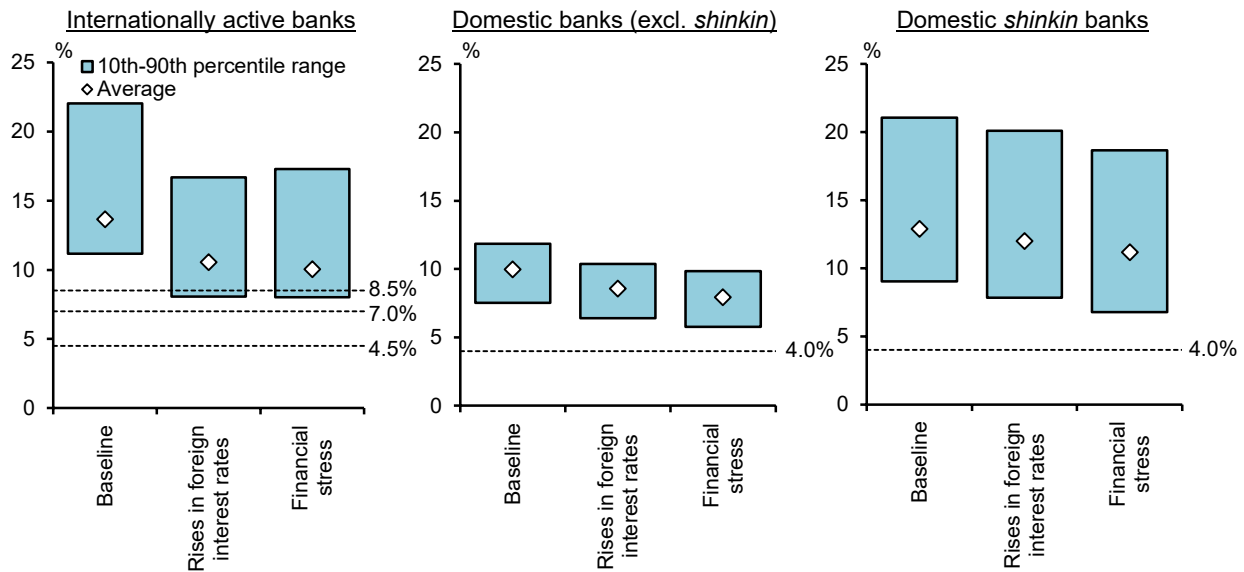
However, as shown in the analysis in the previous *Report*, there are many banks for which the pace of building up retained earnings is slower than in the previous phase of policy rate hikes in fiscal 2006 due to lower core profitability, and therefore it is likely that more banks require a certain amount of time to restore their capital once it is impaired.<sup>66</sup>

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

The results of the macro stress testing indicate that Japanese banks on the whole are resilient to potential future stress such as further rises in global raw material costs and foreign interest rates, or a situation similar to the global financial crisis with substantial and acute adjustments in financial markets and a deterioration in foreign economies occurring at the same time (Chart V-2-6). Banks have increased their resilience by increasing their capital since the global financial crisis, and borrower firms overall have maintained robust financial bases even after the pandemic.

However, there is heterogeneity in banks' core profitability, and even if they have sufficient capital to withstand a one-time shock, some banks may find it difficult to restore their capital once it is impaired. In addition, given that uncertainty remains high, including with regard to geopolitical risks and global financial markets, developments in the economic and financial environment continue to warrant attention. Banks therefore need to be prepared to appropriately manage a variety of risks, including risks such as those described in this section.

<sup>66</sup> For details of the analysis, see Section B of Chapter V in the April 2024 issue of the *Report*.

**Chart V-2-6: Distribution of capital adequacy ratios**

Note: The markers and bands indicate the averages and the 10th-90th percentile ranges of capital adequacy ratios at the end of the simulation period (as of end-fiscal 2026), respectively.

## 5. Sensitivity analysis on yen interest rates

Finally, this section provides a sensitivity analysis assuming that there is a parallel upward shift in yen interest rates only and examines the effects on banks' capital adequacy ratios. Specifically, it is assumed that in the October-December quarter of 2024, there is a 1 percentage point parallel upward shift in short- and long-term interest rates from the baseline scenario, and interest rates remain 1 percentage point above the baseline scenario until the end of the simulation period. Meanwhile, economic variables regarding the domestic and foreign economies and financial variables other than yen interest rates are the same as in the baseline scenario. In addition, management actions by banks in response to a rise in interest rates are not taken into account.

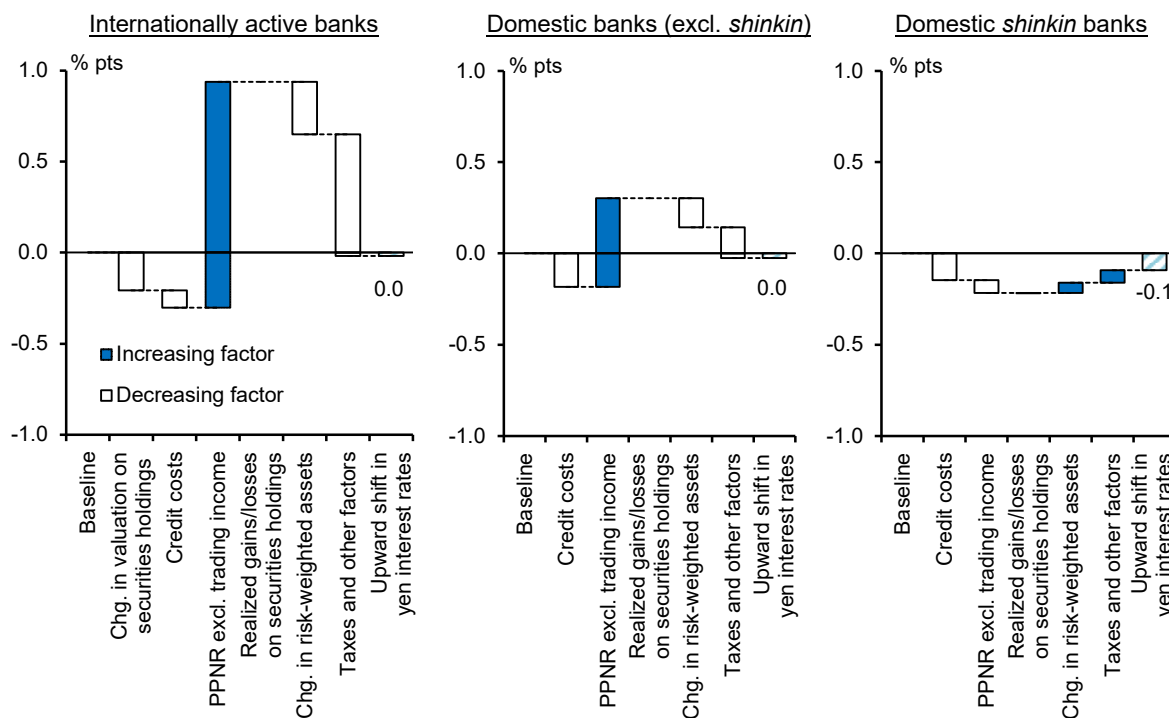
The simulation results indicate that average capital adequacy ratios are almost identical to those in the baseline scenario for all types of banks and remain sufficiently above regulatory levels (Chart V-2-7). For internationally active banks and domestic banks, excluding *shinkin* banks, rises in credit costs and risk-weighted assets offset the effects of a further increase in PPNR excluding trading income. Meanwhile, for internationally active banks, valuation losses on securities holdings also play a role, making a negative contribution. On the other hand, for domestic *shinkin* banks, changes in all these factors are limited.

In detail, domestic lending margins increase for all types of banks (Chart V-2-8). However, the size of increase in domestic lending margins for internationally active banks is larger than that for other types of banks, since the share of market rate-linked loans on the asset side is larger for internationally active banks.

With financial variables other than interest rates the same as in the baseline scenario, credit costs are higher than in the baseline scenario, since the rise in loan interest rates leads to a larger decline in borrower firms' interest coverage ratios (ICRs), resulting in downgrades. Taking a look by type of bank, the increases in credit costs are somewhat higher for domestic banks excluding *shinkin* banks and for *shinkin* banks (Chart V-2-9).<sup>67</sup>

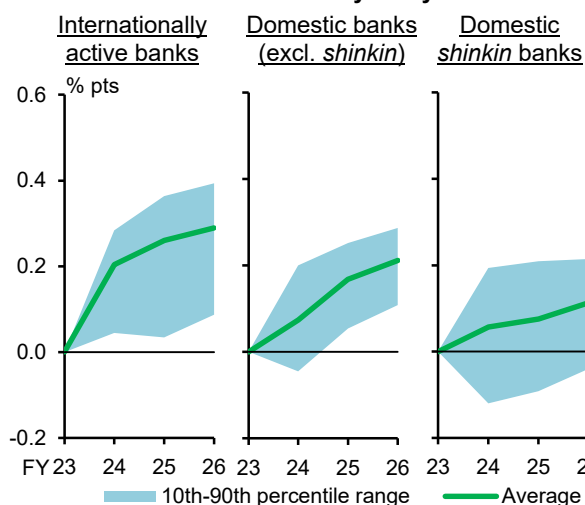
<sup>67</sup> The transition probabilities between borrower classifications in the credit cost model are specified taking

**Chart V-2-7: Decomposition of capital adequacy ratio: Sensitivity analysis, regulatory capital**



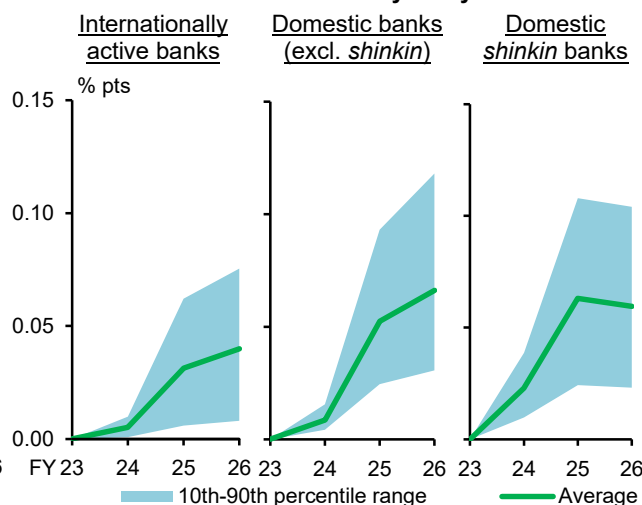
Note: Indicates the contribution of each factor to the difference between the capital adequacy ratios at the end of the simulation period (as of end-fiscal 2026) under the baseline scenario and the scenario of the upward shift in yen interest rates.

**Chart V-2-8: Domestic lending margins: Sensitivity analysis**



Note: Shows the difference between domestic lending margins (the difference between domestic loan interest rates and domestic funding interest rates) under the baseline scenario and the scenario of the upward shift in yen interest rates.

**Chart V-2-9: Credit cost ratios: Sensitivity analysis**



Note: Shows the difference between the credit cost ratios (ratio of credit costs to total loans outstanding) under the baseline scenario and the scenario of the upward shift in yen interest rates.

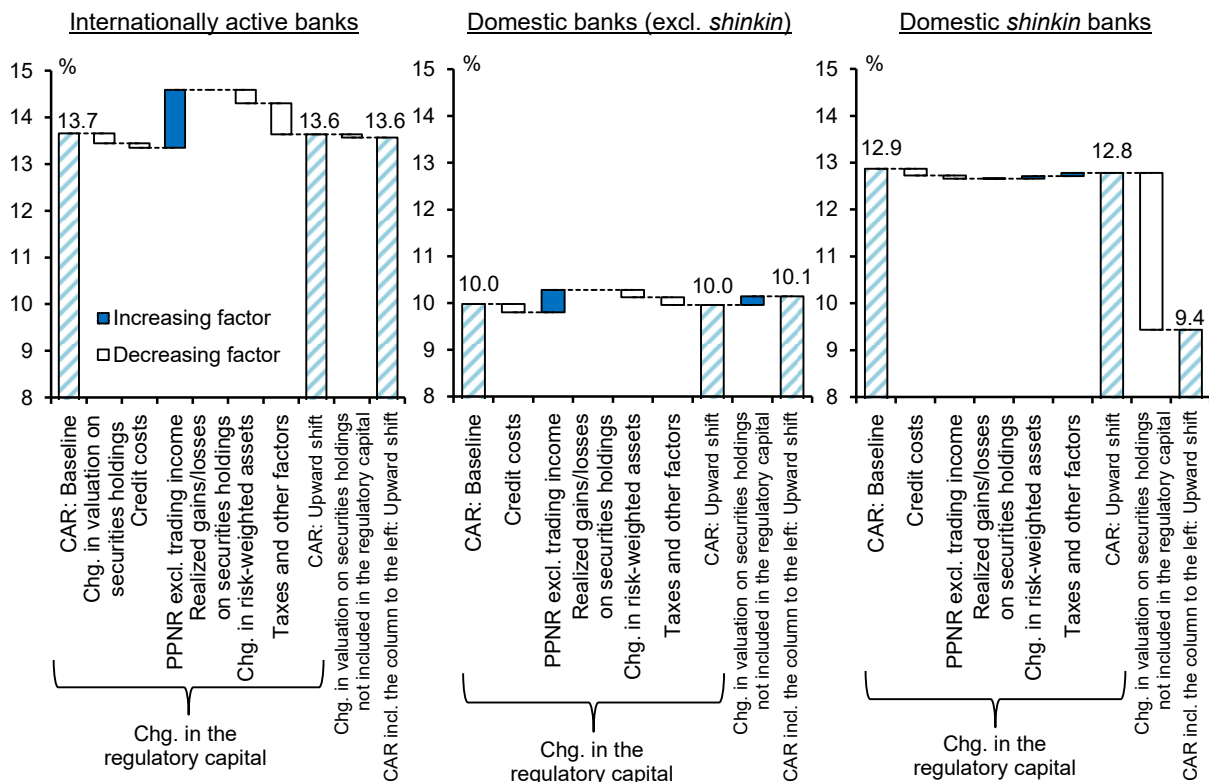
Looking at changes in capital adequacy ratios taking valuation gains/losses on all investment securities into account shows that in response to the upward shift in yen interest rates, these capital adequacy ratios, just like the capital adequacy ratios on a regulatory capital basis, remain sufficiently above regulatory levels on average for all types of banks (Chart V-2-10).<sup>68</sup> Compared

nonlinearities into account based on empirical analyses. For domestic banks excluding *shinkin* banks and for *shinkin* banks, whose borrowers include relatively large numbers of low ICR firms, the transition probabilities to lower ratings are susceptible to increase with the borrowing rate, so that the increase in their credit costs is likely to be larger.

<sup>68</sup> Specifically, all securities are evaluated on a mark-to-market basis, regardless of whether they are held to maturity or whether they are included in regulatory capital.

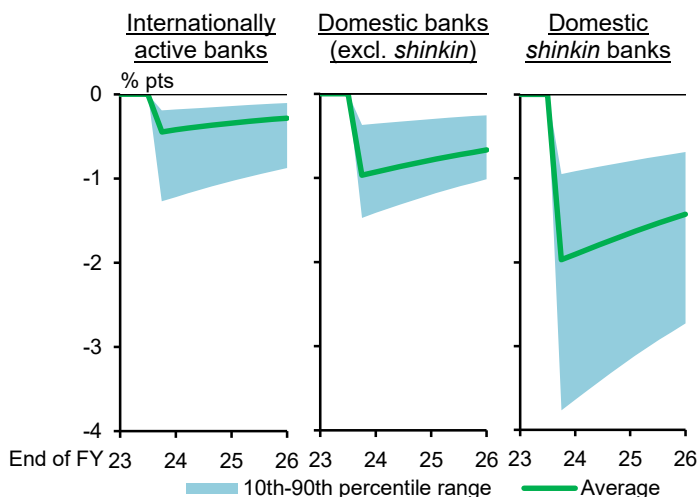
to the capital adequacy ratio on a regulatory capital basis, however, the gap between the ratio and regulatory levels is relatively large for banks whose yen-denominated bondholdings have relatively long durations and for those whose yen-denominated bonds make up a large share in their outstanding amount of investment since valuation losses on investment securities are taken into account. In this context, looking at developments in valuation gains/losses on investment securities in terms of the difference vis-à-vis the baseline scenario shows that, for all types of banks, valuation gains/losses are worse than in the baseline scenario at the beginning of the simulation period; however, since prices of securities approach their face value as they approach maturity, the differences vis-à-vis the baseline scenario decline over time (Chart V-2-11).

**Chart V-2-10: Decomposition of capital adequacy ratio: Sensitivity analysis, capital taking valuation gains/losses on all investment securities into account**



Note: 1. CAR represents capital adequacy ratio.  
 2. Indicates the contribution of each factor to the difference, at the end of the simulation period (as of end-fiscal 2026), between the capital adequacy ratios for regulatory capital under the baseline scenario and capital taking valuation gains/losses on all investment securities into account under the scenario of the upward shift in yen interest rates.

**Chart V-2-11: Valuation gains/losses on securities holdings: Sensitivity analysis**



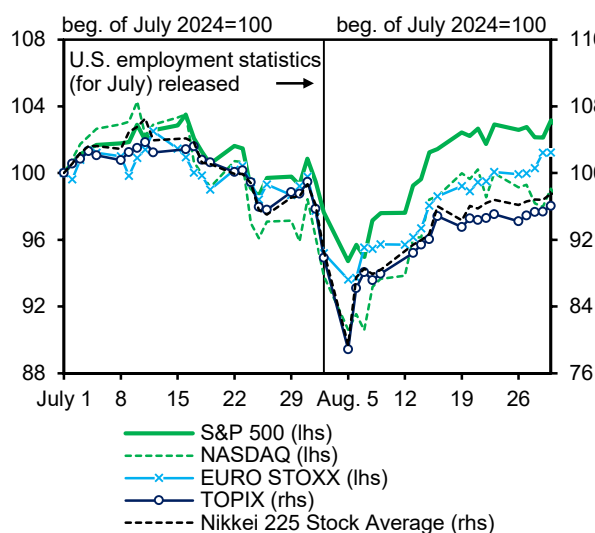
Note: Shows the difference between valuation gains/losses on securities holdings relative to risk-weighted assets at the end of FY2023 under the baseline scenario and the scenario of the upward shift in yen interest rates.



## Box 1: Volatility in financial and foreign exchange markets at the beginning of August 2024

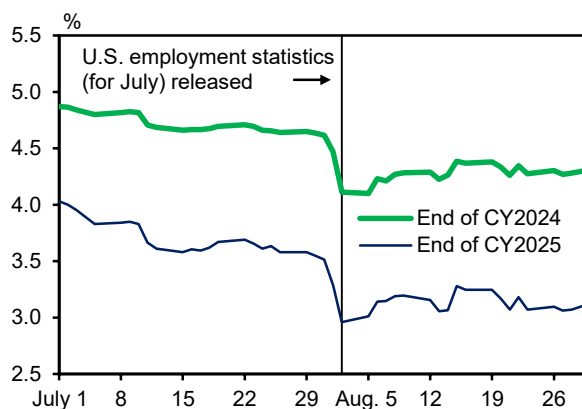
In global financial markets, concerns over a slowdown in the U.S. economy heightened at the beginning of August 2024, triggered by weaker-than-expected U.S. economic data. These concerns precipitated a weakening of the dollar and a decline in stock prices worldwide (Charts B1-1 and II-1-2). In the dollar/yen exchange market, the earlier unilateral depreciation of the yen was corrected, due in part to the global depreciation of the dollar and the changes in the Bank of Japan's monetary policy at the end of July. In Japanese financial markets, stock prices temporarily declined to a greater extent than other economies (Charts B1-1, II-1-2, and II-2-6). Thereafter, the yen has generally been at the 140 level against the dollar, while stock prices have risen from a significantly lowered level seen at the beginning of August. This box summarizes the factors behind the fluctuations in asset prices.

**Chart B1-1: Major stock indexes in Japan, the United States, and Europe from July to August**



Note: Latest data as of end-August 2024.  
Source: Bloomberg.

**Chart B1-2: Federal funds futures rates**



Note: "End of CY2024" indicates the federal funds futures rate for the January 2025 contract. "End of CY2025" indicates the federal funds futures rate for the January 2026 contract. Latest data as of end-August 2024.  
Source: Bloomberg.

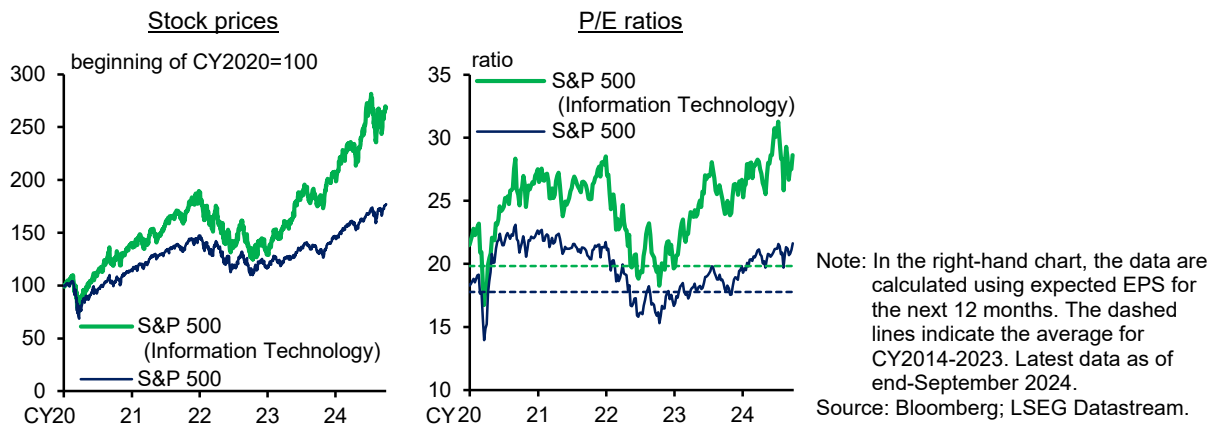
Looking back at the U.S. economy over the past half year, solid economic data, together with the deceleration in the inflation rate due to the past monetary tightening by the Federal Reserve, added to market expectations for a soft landing of the U.S. economy. However, concerns over the risk of a weakening of supply-demand conditions in the labor market emerged from around June, as some economic data came in weaker than market expectations.<sup>69</sup> Subsequently, concerns over a hard landing of the U.S. economy heightened, in response to weaker-than-expected economic data, especially employment statistics, released at the beginning of August. Accordingly, the market rapidly priced in rate cuts by the Federal Reserve (Chart B1-2). Under these circumstances, accumulated investment positions were unwound, triggering large fluctuations in asset prices.

In fact, investment capital was concentrated into certain stocks in the U.S. market, leaving plenty of room for price corrections in terms of valuations. Specifically, the price-earnings (P/E) ratios of major high-tech firms had hovered at high levels relative to current market and historical averages, driven by expectations for a spread of generative artificial intelligence (AI) and other new

<sup>69</sup> For instance, Federal Reserve Chair Powell noted at the press conference following the Federal Open Market Committee meeting held in July that "the upside risks to inflation have decreased" while "the downside risks to the employment mandate are real now."

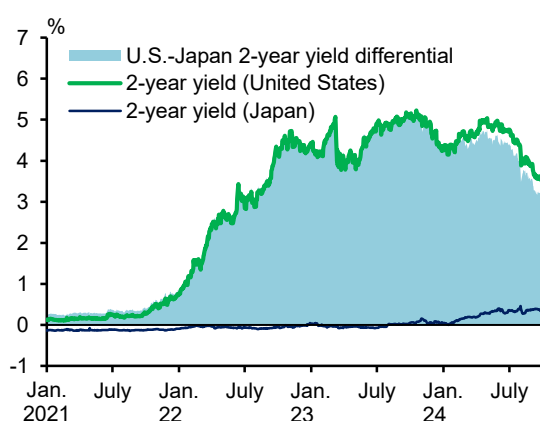
technologies (Chart B1-3). Although U.S. stock prices already showed signs of a decline in July mainly against the background of lower-than-expected earnings of some major high-tech firms, heightened concerns over a U.S. economic slowdown at the beginning of August further induced corrections in stock prices.

**Chart B1-3: Valuations of U.S. stocks**



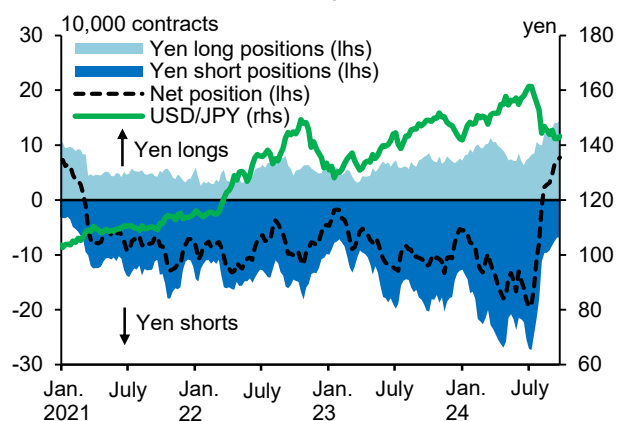
In the dollar/yen exchange market, the yen had recently been under depreciation pressure due to yen carry trades from which investors have attempted to take advantage of the yield differential between Japan and the United States (Chart B1-4). Looking at currency futures positions on the International Money Market (IMM) of the Chicago Mercantile Exchange, for instance, the net yen short position reached a record high in early July 2024, with the accumulation of sizable yen carry positions (Chart B1-5). However, the yen carry positions were rapidly unwound partly due to the global depreciation of the dollar amid heightened concerns over a slowdown in the U.S. economy and to the changes in the Bank's monetary policy at the end of July. Consequently, the yen appreciated against the dollar.

**Chart B1-4: U.S.-Japan 2-year yield differential**



Note: Latest data as of end-September 2024.  
Source: Bloomberg.

**Chart B1-5: IMM yen positions**

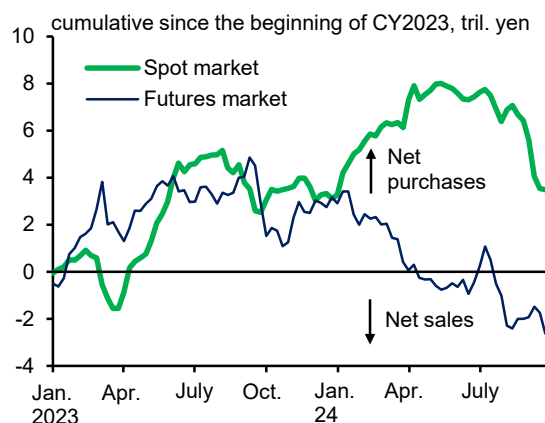


Note: Indicates the total of non-commercial and non-reportable yen positions against the U.S. dollar in currency futures transactions. Latest data as of end-September 2024.  
Source: Bloomberg.

In the Japanese stock market, stock prices were put under downside pressure due to the decline in U.S. stock prices and the yen's appreciation. Japanese stock prices further declined, mainly driven by follow-on selling by foreign investors, who had contributed to the rise in Japanese stock prices until then, and loss-cutting by individual investors engaged in margin trading (Charts B1-6 and B1-7). Consequently, the decline in Japanese stock prices was greater than that in U.S. stock

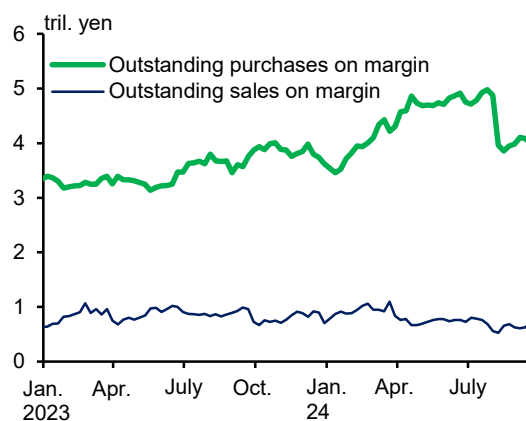
prices. Moreover, amid high volatility in the entire financial market, investors who exceeded risk limits closed positions across a wide range of assets, and this appears to be another factor that amplified the decline in Japanese stock prices.

**Chart B1-6: Net trading volume by foreign investors in the Japanese stock market**



Note: Latest data as of the week ending September 27, 2024.  
Source: Osaka Exchange; Tokyo Stock Exchange.

**Chart B1-7: Outstanding margin trading in the Japanese stock market**



Note: Latest data as of end-September 2024.  
Source: Tokyo Stock Exchange.

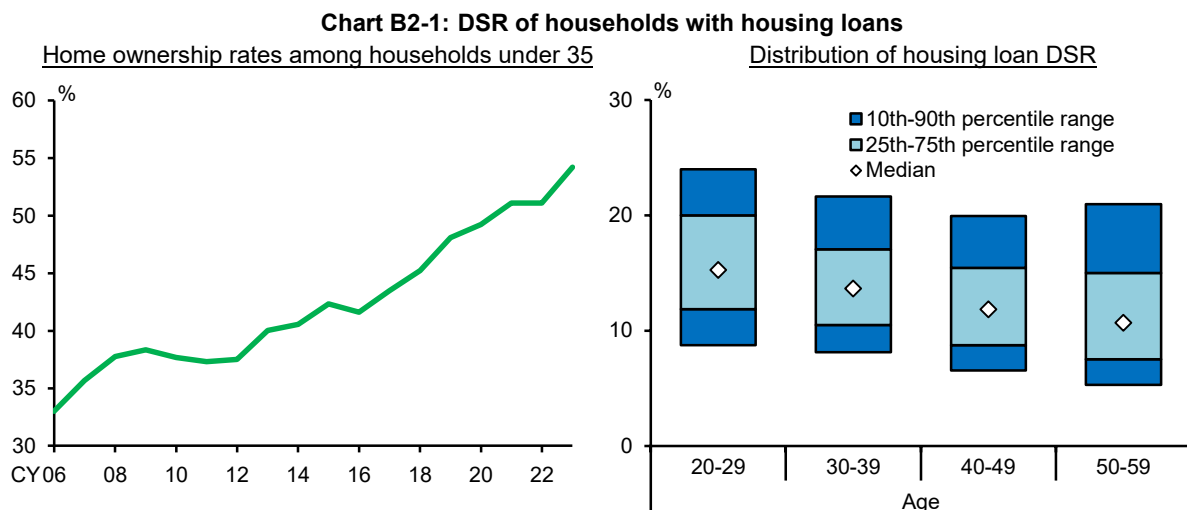
Thereafter, the Japanese stock market swiftly made up the amplified decline, as overly pessimistic views on the outlook for the U.S. economy dissipated; stock prices have risen from the significantly lowered level seen at the beginning of August. However, attention continues to be warranted on the possibility that asset prices could be corrected by significant corrections in market participants' outlook and a rapid unwinding of investment positions, and that this could lead to a global tightening of financial conditions, inducing an unwinding of positions by investors exceeding risk limits.

## Box 2: Risk characteristics of housing loans by age and region

This box provides an overview of the risk characteristics of housing loans, focusing on borrower households' financial conditions by age of household head and on banks' stance toward such loans, by region.

### *Characteristics of households with housing loans by age group*

The outstanding amount of housing loans, which account for the majority of household debt, has continued to increase. With lending competition intensifying, banks are becoming more proactive in their stance on housing loans to meet the vigorous demand for home ownership among younger borrowers. In fact, while the economic recovery and improved borrowing environment are also likely to have played a significant role, the home ownership rate among young households has increased markedly in recent years (Chart B2-1). A survey examining borrower households' debt servicing ratio (DSR) during the repayment period by age of household head shows that the DSR of borrower households in their 20s and 30s tends to be higher than that of those in their 40s and 50s, who account for a larger share of overall housing loans. This is likely due to the fact that younger age groups generally have a lower labor income, which forms part of the denominator of the DSR, than those in their 40s and 50s.



Note: 1. The left-hand chart covers two-or-more-person households whose head is under 35 years old. 3-year backward moving averages. Latest data as of 2023.

2. The right-hand chart covers households with housing loans. Shows DSR of each household as of 2019.

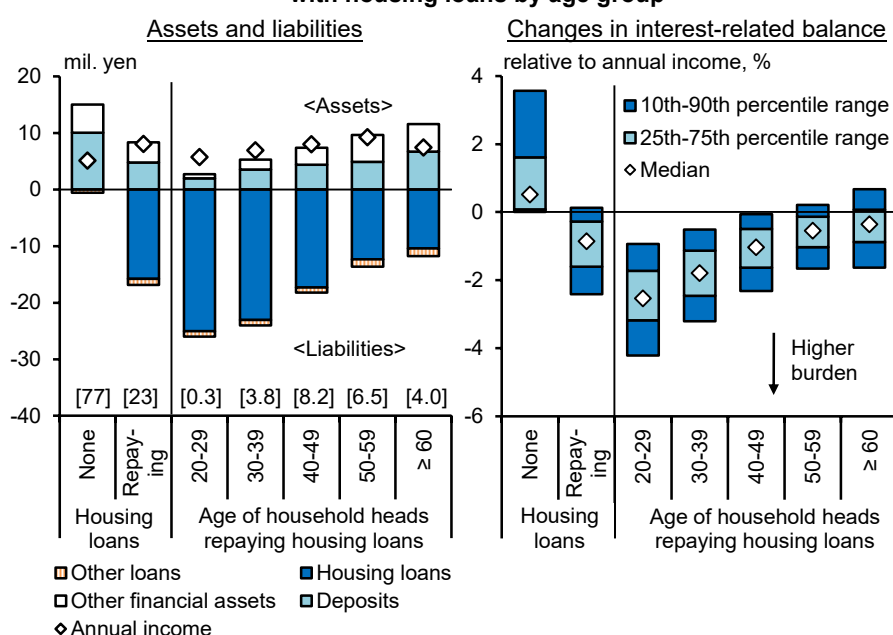
Source: Ministry of Internal Affairs and Communications.

Looking at borrower households' balance sheets shows that the younger the household, the larger the housing loan and the smaller the amount of household financial assets such as deposits (left panel of Chart B2-2). Given that recently 80 percent of outstanding housing loans have been floating-rate loans, it is likely that households' interest-related balance tends to deteriorate when interest rates rise. Using information on households' balance sheets and income by age group to estimate the average impact of a 1 percentage point rise in short-term interest rates indicates that the deterioration in the interest-related balance relative to income is greater for younger households and decreases with age (right panel of Chart B2-2).<sup>70</sup> This suggests that households' resilience to

<sup>70</sup> Chart B2-2 presents estimates of changes in the interest-related balance per household for a rise in short-term interest rates by 1 percentage point, based on microdata from the 2019 National Survey of Family Income, Consumption and Wealth. The main assumptions are as follows: For interest payments, (1) the share of floating-rate loans is assumed to be 100 percent for housing loans and 35 percent for other loans such as consumer loans. (2) For all loan interest rates, the pass-through of changes in short-term interest rates is 100 percent. For interest

interest rate risk increases with age on average, since labor incomes tend to rise from the age of 20 over the life cycle and the outstanding housing loan amount itself decreases as the principal is repaid. Moreover, younger households are increasingly taking out loans with longer repayment periods in order to keep monthly repayments low. A look at changes in the DSR of younger borrower households during the repayment period shows that this is gradually declining as a trend mainly due to a decrease in principal and interest payments (Chart B2-3). In addition, rules to prevent drastic changes in payments for housing loans, such as the "5-year rule" and the "125 percent rule," act to curb short-term increases in the repayment burden when interest rates rise, and in the somewhat longer run, the gradual economic recovery and wage increases, including movements along the wage curve, would also mitigate the increase in the repayment burden to a large extent.

**Chart B2-2: Financial assets and liabilities of households with housing loans by age group**



Note: Covers all households. The left-hand chart shows the averages per household. Figures in brackets indicate the share of households. Interest-related balance in the right-hand chart includes principal payments of housing loans. Data as of 2019. Source: Ministry of Internal Affairs and Communications.

**Chart B2-3: DSR of younger households**



Note: Covers workers' households with two or more persons that are repaying housing loans and whose household head is under 40 years old. Shows DSR of housing loans as of each year.

Source: Ministry of Internal Affairs and Communications.

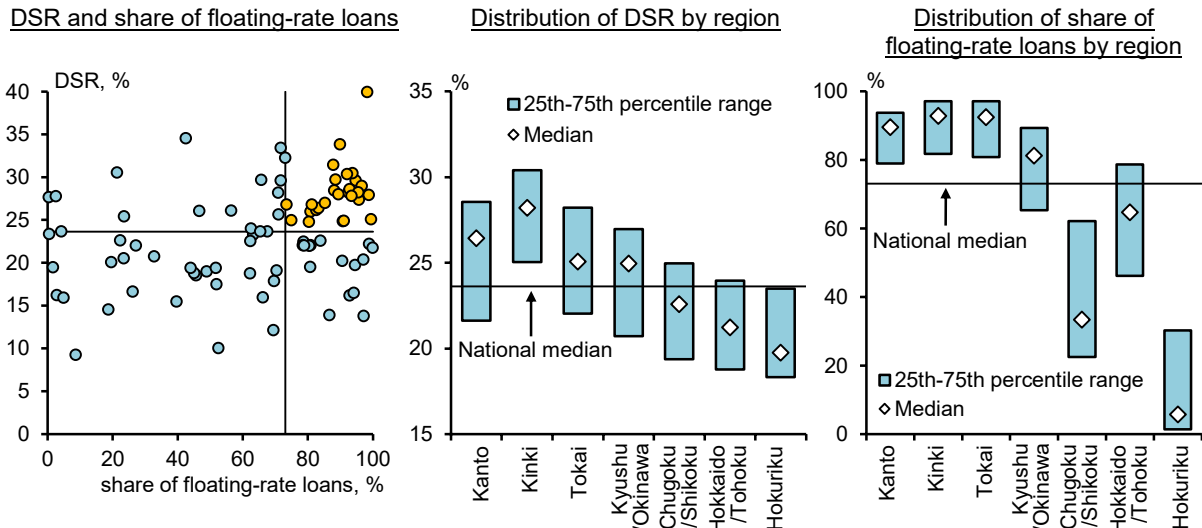
### *Banks' stance toward housing loans by region*

Next, using data from the regional banks that provide housing loans, a look at borrowers' DSRs at the time of housing loan origination reveals that DSR levels vary widely across banks, ranging from 10 to 30 percent. Among banks with high borrower DSRs, many also have a high share of floating-rate loans (left panel of Chart B2-4). By region, banks in urban areas especially (Kanto, Kinki, Tokai, and Kyushu/Okinawa) tend to have a large share of high DSR borrowers, and a large share of their loans tend to be floating-rate loans (middle and right panels of Chart B2-4). These banks are

income, (3) the pass-through on interest receivables is assumed to be 40 percent for demand deposits, 80 percent for time deposits, and 100 percent for bonds. (4) The share of time deposits coming up for interest rate renewal during the estimation period (i.e., within one year) is assumed to be a uniform 80 percent. It should be noted that in many cases, floating-rate housing loans are subject to the "5-year rule," which fixes the monthly repayment amount for five years from the loan date, and the "125 percent rule," which stipulates that if repayments are revised, principal and interest payments in the following five years may not exceed 125 percent of the previous payment amount, as rules to mitigate drastic changes in principal and interest payments. In the analysis here, only the "125 percent rule," which requires fewer assumptions for the estimation, is taken into account.

thought to have increased their housing loan lending to young households, among whom demand is strong, amid improving real estate market conditions in urban areas, and this appears to be reflected in the high borrower DSRs. In fact, examining the determinants of households' DSRs using the results of a household survey shows a statistically significant relationship that the younger the borrower household head, the higher the DSR. It should be noted, however, that, in addition to households' financial assets and prefectural land prices, the size of DSRs is also determined by other, unexplained regional characteristics (Chart B2-5).

**Chart B2-4: Regional banks' housing loan DSR at the time of origination**



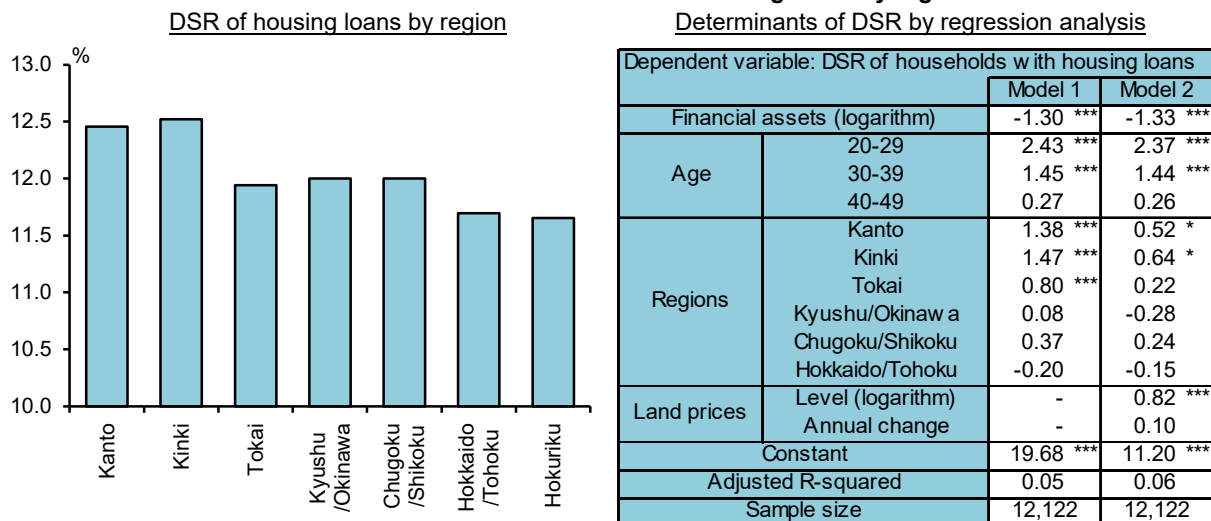
Note: 1. Covers housing loans of regional banks.

2. In the left-hand chart, the vertical and horizontal solid lines indicate the medians of regional banks. The yellow dots indicate banks whose DSR and share of floating-rate loans are higher than the medians.

3. Data as of end-March 2024.

Source: BOJ.

**Chart B2-5: DSR of households with housing loans by region**



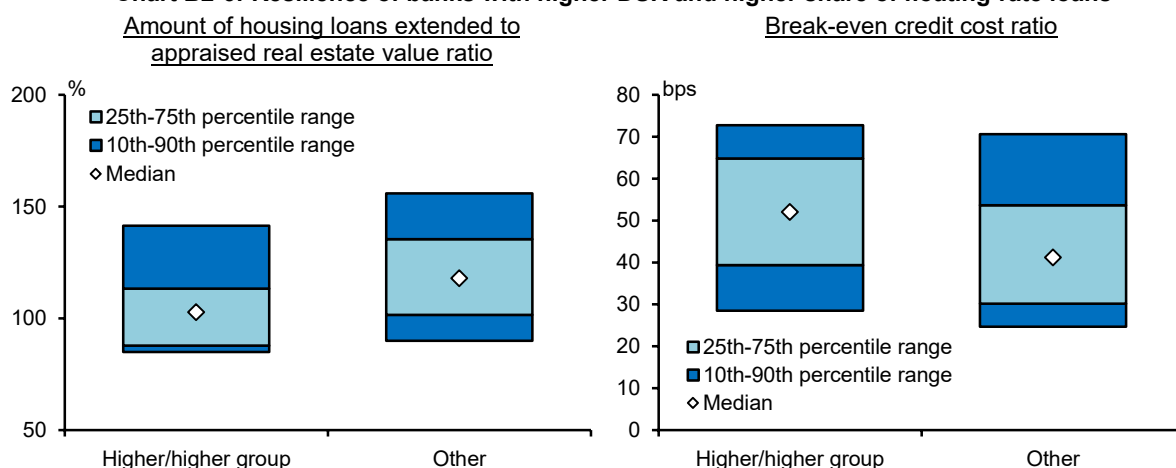
Note: 1. The left-hand chart covers households with housing loans. Shows the medians of DSR as of 2019.

2. The right-hand chart covers households with housing loans whose head is under 60 years old. In the regression, the base category of the dummy variable for age of household head is the age of 50-59, and the base category of the dummy variable for region is Hokuriku. The land prices are residential land prices per square meter in each prefecture as of 2019. \*\*\* and \* indicate statistical significance at the 1 percent and 10 percent levels, respectively.

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

In terms of risks to the credit protection of housing loans, looking at housing loans extended in terms of the loan-to-value (LTV) ratio shows that for banks with both high borrower DSRs and a large share of floating-rate loans, the LTV ratios tend to be relatively low, indicating that these banks restrict loan amounts to within a certain range, relative to housing prices. Moreover, banks with a higher borrower DSR and higher floating-rate loan share tend to have a high short-term loss-absorbing capacity through profit buffers such as high break-even credit cost ratios (Chart B2-6).<sup>71</sup> When interest rates are raised, there could be changes such as borrowers with floating-rate housing loans accelerating the payment of principal and borrowers with fixed-rate housing loans curtailing the early payment of principals. Keeping this complex spillover channel of changes in interest rates in mind, banks that handle many housing loans need to continue to carefully conduct credit screening and subsequent monitoring, such as of the income environment, taking into account the possibility that borrowers' debt servicing capacity may deteriorate, as well as to strengthen their risk resilience in financial and other aspects.

**Chart B2-6: Resilience of banks with higher DSR and higher share of floating-rate loans**



Note: 1. Covers regional banks. "Higher/higher group" indicates banks whose DSR and share of floating-rate loans are higher than the medians.  
 2. In the left-hand chart, there are banks that answer disposable values as appraised values from the perspective of internal risk management. In the right-hand chart, break-even credit cost ratio is the ratio of PPNR excluding trading income to loans outstanding.  
 3. Data as of March 2024.  
 Source: BOJ.

<sup>71</sup> Since nearly 80 percent of housing loans are guaranteed, even if borrowers were to default, this would shield banks from directly incurring credit costs. That said, there are cases where credit guarantees are provided by affiliated guarantee companies within the same banking groups. It should be noted that in such cases, banks bear the credit costs on a consolidated basis. For details on the credit risk of housing loans, see Box 2 in the April 2024 issue of the *Report*.

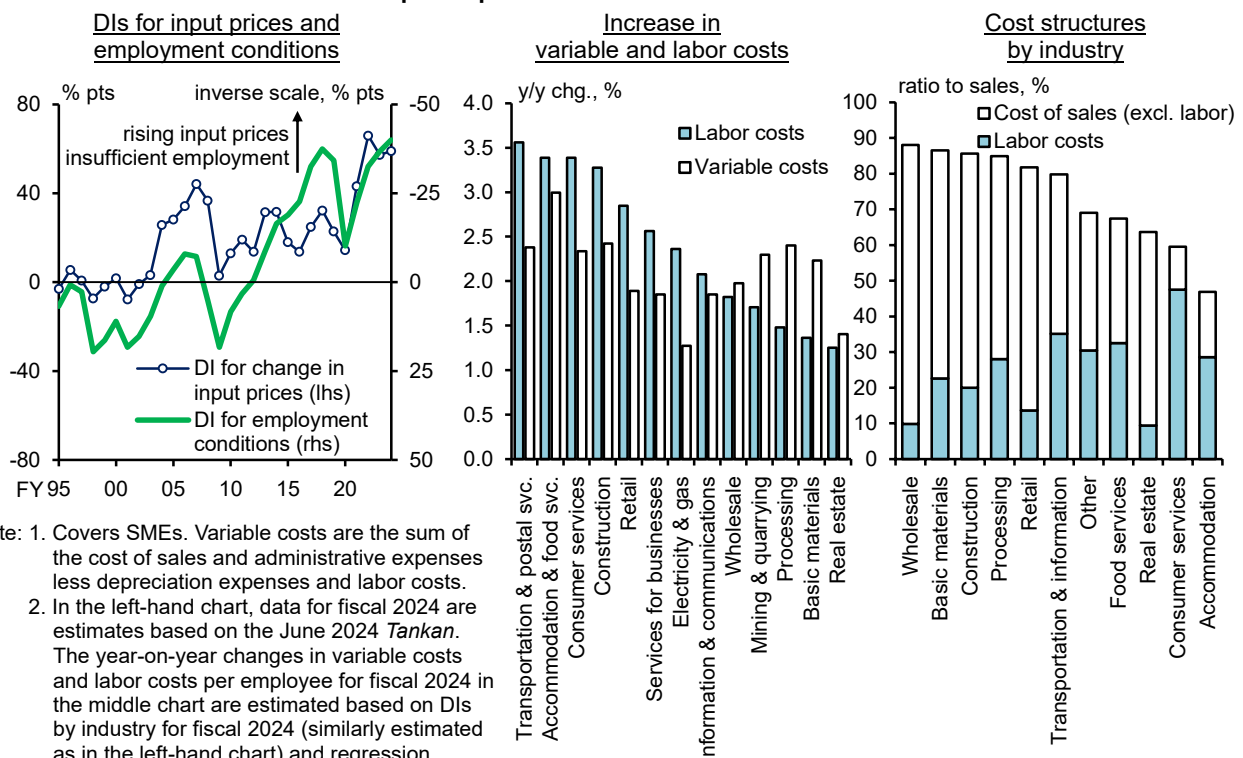


### Box 3: Impact of rising raw material and labor costs on credit costs

The recent rise in raw material costs, mainly due to the rise in import prices, and in labor costs will have varying effects on banks' credit costs depending on firms' price pass-through rates and cost structures. Although in some respects it has been easier for firms to pass on higher costs in recent years than in the past, it is possible that higher costs have caused rises in actual default rates, particularly in industries where variable costs and labor costs make up a large share in their sales and where it is relatively difficult to pass on costs. This box provides an overview of the impact of rising variable and labor costs on SMEs' financial conditions and probability of default.

Examining the impact of recent cost increases on SMEs' profits shows that their current profits have been improving, mainly reflecting the increase in sales against the backdrop of the continuing moderate economic recovery. However, a breakdown of this improvement indicates that increased labor costs have acted as downward pressure since fiscal 2022 (middle panel of Chart IV-1-4). The DIs for input prices and employment conditions in the *Tankan* have both shifted substantially, pointing to increasing input prices and tightening employment conditions (left panel of Chart B3-1). Estimating the extent of cost increases in fiscal 2024 relative to fiscal 2023, based on the past relationship between variable and labor costs and these DIs, suggests that the impact of higher labor costs will be pronounced in labor-intensive industries such as consumer services and transportation and postal services, and that variable costs will rise substantially in accommodation and food services and in manufacturing (middle panel of Chart B3-1).

**Chart B3-1: Upward pressure on raw material costs and labor costs**



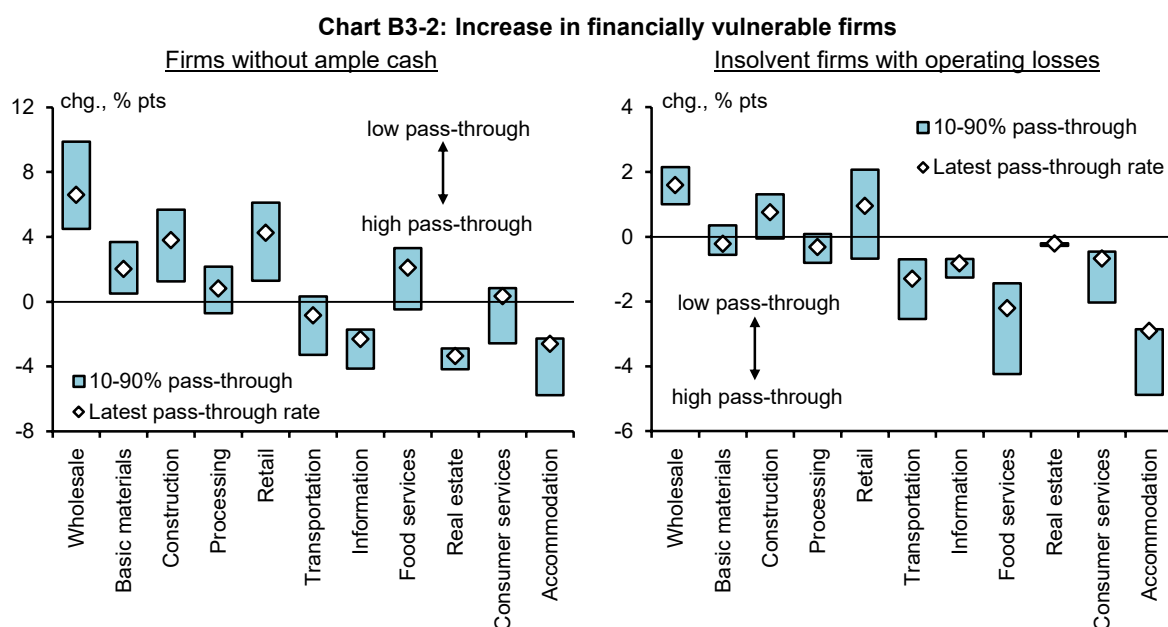
Note: 1. Covers SMEs. Variable costs are the sum of the cost of sales and administrative expenses less depreciation expenses and labor costs.  
 2. In the left-hand chart, data for fiscal 2024 are estimates based on the June 2024 *Tankan*. The year-on-year changes in variable costs and labor costs per employee for fiscal 2024 in the middle chart are estimated based on DIs by industry for fiscal 2024 (similarly estimated as in the left-hand chart) and regression results using fiscal yearly average data.  
 3. Data as of fiscal 2023 for the right-hand chart. Shows the median values by industry.  
 Source: CRD Association; Ministry of Finance; BOJ.

As noted above, increases in raw material and labor costs are expected to have varying effects across firms and industries, depending not only on the size of the increase but also on firms' price

pass-through rates and cost structures. Looking at differences in price pass-through rates across industries shows that industries such as wholesale are relatively likely to pass on higher prices, while pass-through rates in the transportation and warehousing, food services, and real estate industries tend to be low (Chart IV-1-9). Moreover, in terms of cost structures, the cost of sales ratio is high in the wholesale, retail, and construction industries, while the ratio of labor costs to sales is high in labor-intensive industries such as consumer services, transportation and information, and food services, suggesting that each of these industries is susceptible to the impact of increases in factor prices such as raw material costs and wages (right panel of Chart B3-1).

Next, the impact on firms' financial conditions and probability of default is estimated based on the above mentioned increases in raw material and labor costs and firms' cost structures.<sup>72</sup> The results show that while the increase in the probability of default in fiscal 2024 implied by the *Tankan* data is generally limited, the impact could vary substantially depending on the price pass-through rate (left panel of Chart IV-1-11).

Looking at the estimation results by industry, the financial conditions of firms in industries with a high cost of sales ratio, such as the wholesale, retail, and construction industries, deteriorate to a relatively large extent as the increase in costs exceeds the pace of recovery in sales. This is evident from an increase in the share of firms with cash shortages and of firms that are making operating losses and are insolvent (Chart B3-2). As a result, the increase in the probability of default is also relatively large for these industries (right panel of Chart IV-1-11). Looking ahead, while the impact of higher raw material and labor costs on SMEs' financial conditions and defaults overall is expected to be limited amid the ongoing recovery of the economy, firms with existing unfavorable business conditions and those with susceptible cost structures will be affected to a certain degree, so the effects of such firms' financial conditions and developments in bankruptcies on credit costs need to be monitored carefully.



Note: Shows the estimated change in shares of respective firms from fiscal 2023 to 2024. "Latest pass-through rate" refers to data from the July 2024 survey by the Teikoku Databank. The bands indicate the range in which the shares would change depending on the rate of price pass-through. Covers SMEs. Industries are sorted by descending order of their variable and labor costs relative to sales.

Source: CRD Association; Ministry of Finance; Teikoku Databank; BOJ.

<sup>72</sup> Firms' sales, on which these estimates are based, are estimated by multiplying sales for fiscal 2023 by growth rates based on industry-level sales forecasts in the June 2024 *Tankan* and are adjusted using past revision rates.

#### Box 4: Overview of a common data platform

The Financial Services Agency (FSA) and the Bank have been working toward integrating their data in order to enhance their monitoring capabilities and reduce the burden on banks. As part of these efforts, they are working on establishing a "common data platform," a novel framework for the collection and management of data. This box outlines the progress made in establishing the common data platform and current developments and future prospects regarding the enhancement of monitoring and analytical capabilities using granular data, the collection of which has already started in a phased manner.

Details of efforts made to date toward the establishment of the common data platform are outlined in two joint releases by the FSA and the Bank, *Progress in Data Integration and Next Steps* (June 2023) and *Progress in Common Data Platform and Next Steps* (July 2024). The following is a brief summary of these efforts: starting with a survey on developments overseas in fiscal 2021, the two entities conducted a joint experiment and in fiscal 2023 started to collect granular data from regional banks I in a phased manner. In view of the commencement of full-scale data collection from fiscal 2025, the FSA and the Bank have recently been deliberating on data formats and definitions with regard to data from major banks and regional banks II (Chart B4-1). Meanwhile, it turned out that the collection and management of the data would impose a considerable burden on both the banks, in terms of preparing the data, and the FSA and the Bank, in terms of organizing their operations. Thus, the FSA and the Bank have continued with discussions on practical aspects, such as reducing the burden on banks.

Chart B4-1: Progress in the common data platform

Fiscal year	Detail
2021	Survey on developments overseas
2022	Joint experiment to collect transaction-level corporate loan data from some banks
2023	Started to collect granular data in a phased manner
2025	Planning to start full-scale data collection

Source: Financial Services Agency & BOJ.

#### Example: extraction of zero-zero loans

The granular data from the common data platform, the collection of which has started in a phased manner, are beginning to be used to enhance monitoring and analysis of the financial system. The analysis of zero-zero loans in Section A of Chapter IV uses data such as detailed loan data collected via the common data platform.<sup>73</sup> Although these loan data include information such as the amount, interest rate, and term of each loan, there are no flags to identify whether a loan is a zero-zero loan. While identifying which loans are zero-zero loans is a challenge, this *Report* focuses on the possibility of identifying zero-zero loans by using the wide range of information available in the common data platform.

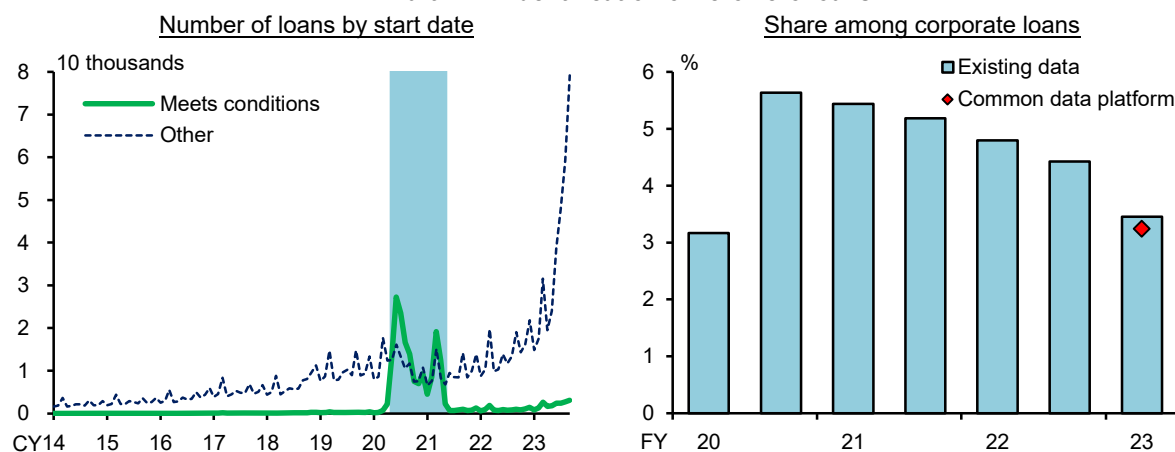
Specifically, taking advantage of the fact that interest rates on zero-zero loans are the same for each credit guarantee corporation, of loans that were extended during the period between May 2020 and May 2021 when zero-zero loans were provided by privately-owned financial institutions, those that meet the following conditions are extracted as zero-zero loans: (1) loans were extended

<sup>73</sup> The analysis in this *Report* is based on the loan data of member banks of the Regional Banks Association of Japan as of the end of September 2023.

at a fixed rate that corresponds to the interest rate offered by individual credit guarantee corporations, (2) the principal was within the maximum guaranteed amount of 60 million yen, and (3) the loan period was within the maximum guarantee period of 10 years.<sup>74</sup>

The results show that loans that meet the above conditions are concentrated during the period when zero-zero loans were extended by privately-owned financial institutions and that the outstanding amount of zero-zero loans extracted using data from the common data platform is generally consistent with the aggregate amount obtained using existing data (Chart B4-2). Moreover, linking such information with detailed data on the borrowers in the common data platform will enable analysis of the financial conditions of firms that took out zero-zero loans (Chart IV-1-19). As more granular data are collected, it should be possible to conduct time series analyses. Using these granular data will enable more detailed monitoring that will help toward an understanding of risks in the financial system amid changes in financial and economic conditions.

**Chart B4-2: Identification of zero-zero loans**



Note: 1. "Meets conditions" in the left-hand chart refers to the loans that meet all the conditions (1) to (3) in the main text, regardless of their start date. "Other" refers to the loans that do not meet one or more of the conditions. The shaded area indicates the period when zero-zero loans were provided by privately-owned financial institutions (between May 2020 and May 2021).

2. "Existing data" for fiscal 2020 in the right-hand chart are estimated values.

3. Latest data as of end-September 2023.

Source: BOJ.

<sup>74</sup> Tokyo is the exception with a maximum guaranteed amount of 100 million yen.

## 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 valuation 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 valuation 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 consists of common equities and retained earnings, etc. (including accumulated other comprehensive income).

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.