



BOJ
Reports & Research Papers

Financial System FSR report



BANK OF JAPAN
OCTOBER 2023

The total of major banks, regional banks, and *shinkin* banks covered in this *Report* is as follows (as of end-September 2023).

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 2023.

Please contact the Financial System and Bank Examination Department at the e-mail address below to request permission in advance when reproducing or copying the contents of this *Report* for commercial purposes.

Please credit the source when quoting, reproducing, or copying the contents of this *Report* for non-commercial purposes.

Financial System Research Division,
Financial System and Bank Examination Department, Bank of Japan
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 2023 issue

This issue of the *Report* focuses on various risk-taking behaviors that lie behind financial intermediation activities and assesses the resilience of and potential vulnerabilities in Japan's financial system by analyzing them from the following two perspectives.

First, the *Report* thoroughly examines banks' interest rate risk. Interest rate risk is a fundamental risk for banks, which engage in maturity transformation. The significance of managing such risk has been highlighted by the U.S. bank failures in March 2023. In Japan, banks' interest rate risk has also increased under the prolonged low interest rate environment. With a view to sophisticating risk management, it is essential to deepen understanding of the mechanism in which interest rate risk could materialize due to interest rate fluctuations.

Second, the *Report* examines potential credit risk posed to banks. The quality of banks' loan portfolios has been maintained to date, even with an increase in corporate bankruptcies. However, with global financial conditions continuing to tighten, borrower firms' financial conditions could deteriorate due to the cumulative rise in various input/funding costs and a slowdown in the global economy. Moreover, banks' exposure to real estate businesses has been expanding at home and abroad. Against this background, it is important to accurately assess changes in their credit risk profiles.

Contents

Chapter I. Executive summary: Stability assessment of Japan's financial system	1
Chapter II. Risks observed in financial and capital markets	7
A. Global financial markets	7
B. Japanese financial markets	10
C. Risks to financial markets	13
Chapter III. Financial intermediation	16
A. Financial intermediation by the banking sector	16
1. Loans	
2. Securities investment	
B. Financial intermediation by the non-bank financial sector	22
C. Financial cycle	26
1. The financial cycle and risks to economic growth	
2. Financial cycle and real estate market	
Chapter IV. Risks faced by financial institutions	35
A. Credit risk	35
1. Domestic credit risk	
2. Foreign credit risk	
B. Market risk associated with securities investment	46
C. Interest rate risk in the banking book	53
1. Changes in balance sheets over the medium to long term	
2. The link between interest rate pass-through and interest rate risk	
D. Funding liquidity risk	59
E. Risks posed by changes in the business environment	63
1. Risks related to digital technologies	
2. Climate-related financial risks	

Chapter V. Resilience of the financial system	69
A. Banks' capacity to absorb losses	69
1. Capital adequacy and loss-absorbing capacity	
2. Capital policies based on capital bases and profitability	
B. Macro stress testing	75
1. Baseline scenario	
2. Financial stress scenario	
3. Inverted yield curve scenario	
4. Evaluation of the resilience of the financial system	
Box 1: Contagion risks in the commercial real estate market	82
Box 2: The stickiness of deposits and its variability	85
Glossary	89

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

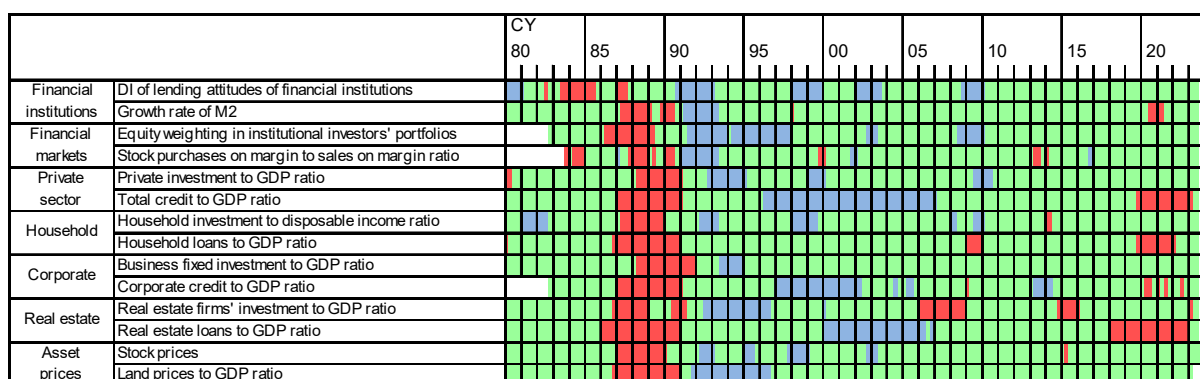
Japan's financial system has been maintaining stability on the whole. Japanese banks have sufficient capital bases to perform financial intermediation activities appropriately even amid the global tightening of financial conditions and the resultant various types of stress. They also have stable funding bases, especially small, sticky retail deposits. Even after uncertainty over the financial sectors in the United States and Europe heightened in March 2023, Japan's financial system has been sound and resilient.

However, vigilance against tail risks continues to be warranted. The period of stress may be prolonged further with continuing monetary tightening by central banks and the resultant concerns about a slowdown in foreign economies. Uncertainty about future developments is similarly noted in financial and capital markets. From a long-term perspective, if banks' core profitability were to stagnate and capital accumulation were to stall, financial intermediation could be impaired due to a decline in loss-absorbing capacity, or vulnerabilities in the financial system could increase through excessive search for yield. To ensure the stability of Japan's financial system, it is necessary to examine these risks of contraction and overheating in the financial system and address potential vulnerabilities appropriately.

Financial cycle and interest rate risk → Chapters III-C, IV-C, and Box 2

No major financial imbalances can be observed in current financial activities (Chart I-1). The large increase in private debt since the outbreak of the pandemic is due to cautious cash management, especially by small and medium-sized enterprises (SMEs), aimed at securing ample cash reserves. However, in the medium to longer term, borrowing terms for corporate and household loans have become longer with the increase in private debt (Chart I-2). Firms have secured stable funding at long-term fixed interest rates and contained refinancing risk, seizing an opportunity from the decline in long-term interest rates. Households have reduced their monthly repayment burden for large-lot housing loans through long-term floating-rate loans at low interest rates.

Chart I-1: Heat map



Note: See Chart III-3-1.

Reflecting the longer borrowing terms, banks' duration gap -- the difference between repricing schedules of interest payment for assets and liabilities (not taking core deposits into account) -- has widened compared to a decade ago (Chart I-3). At major banks, this is due to the increase in long-term fixed-rate loans. At regional and *shinkin* banks, changes in lending, as well as the shift to investments in long-term bonds in their securities investment, have led to the widening of the gap. The longer durations on the asset side and resultant increase in the amount of interest rate

risk are offset by core deposits (Chart I-4). Looking at banks as a whole, 100 BPV interest rate risk, taking core deposits into account, is generally in balance between assets and liabilities. Banks need to maintain the loss-absorbing capacity to cope with the interest rate risk, as well as manage risk more prudently as the duration gap has become wider than in the past.

Chart I-2: Borrowing term

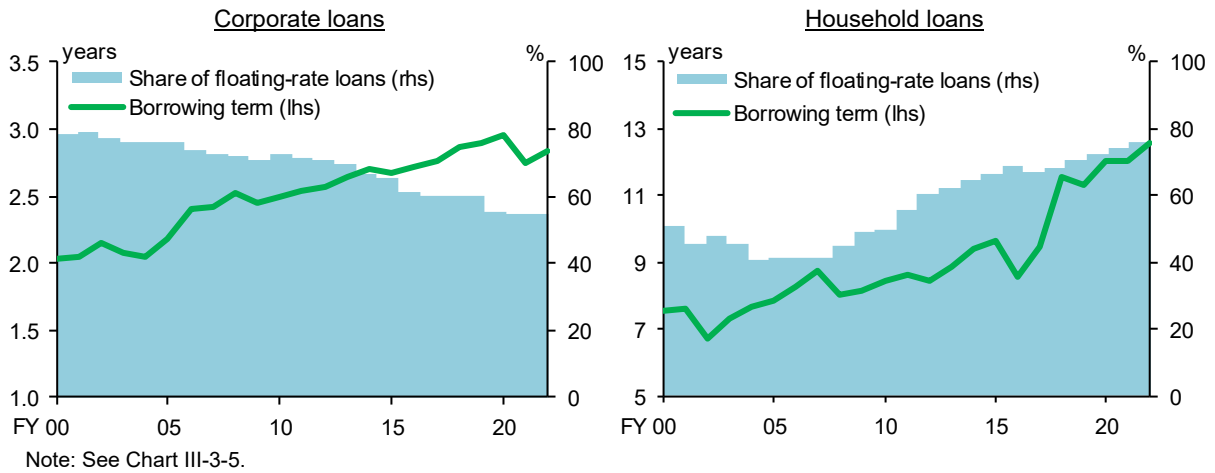


Chart I-3: Duration gap

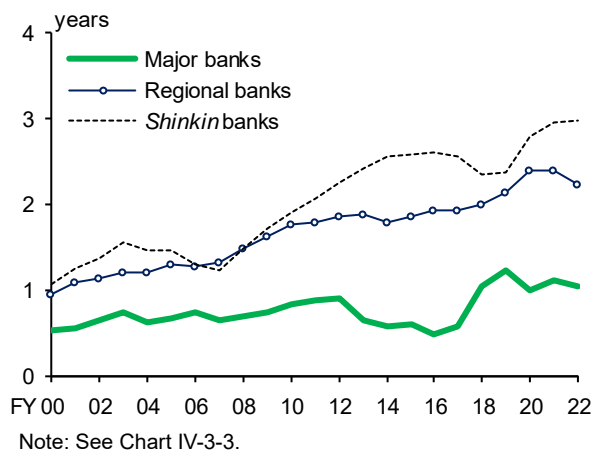
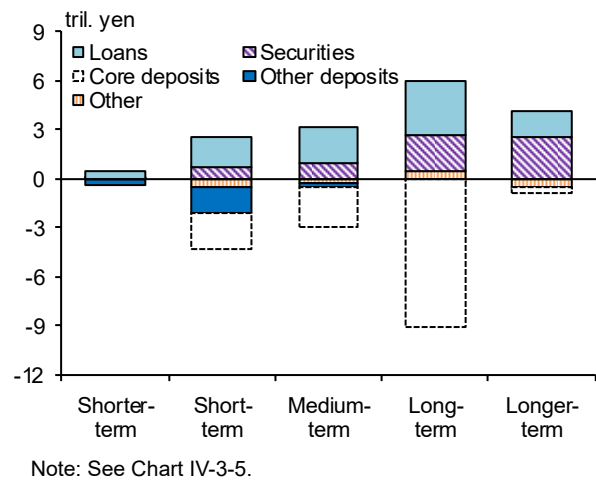


Chart I-4: Interest rate risk



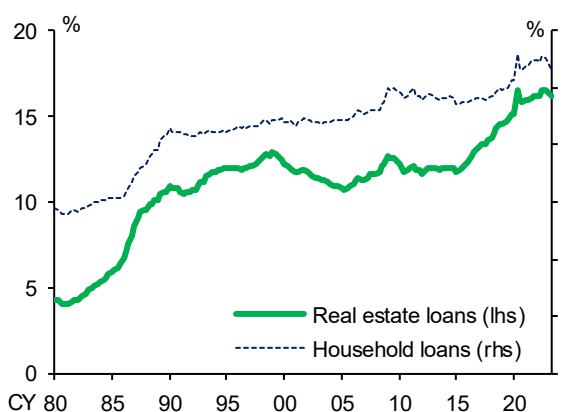
Financial cycle and the real estate market → Chapters III-A, III-C, and Box 1

In the financial cycle, the rebalancing of private debt and economic activity has continued as the economy has recovered. Even against this background, real estate loans have continued to increase (Chart I-5). In the real estate transaction market, there continues to be demand for funds, mainly by foreign investors. In the real estate leasing market, the rise in investment in fixed assets by real estate leasing businesses and the corresponding increase in lending by regional banks have continued. Real estate-related loans, such as loans to real estate businesses and housing loans, have contributed to some degree to the trending longer borrowing terms mentioned earlier (Chart I-2).

In the real estate transaction market, changes can be seen in not only liabilities but also assets of real estate businesses, as well as in real estate prices. On the asset side, the *real estate firms'*

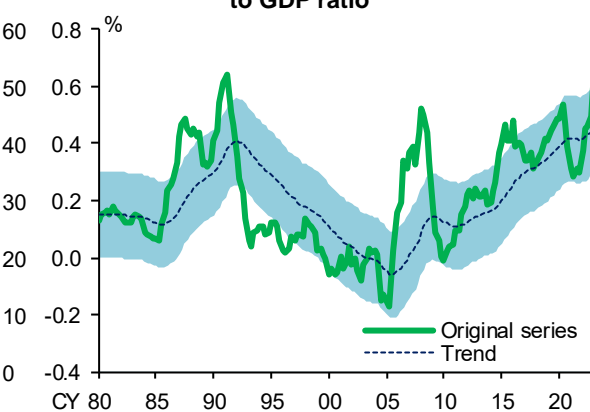
investment to GDP ratio temporarily turned "red" in the heat map, which signals overheating (Chart I-6).¹ The increase in real estate firms' investment has been accelerated by urban redevelopment projects by major real estate developers. In terms of prices, valuations of some properties seem relatively high (Chart I-7). Land prices have shown only small fluctuations across Japan, but in some limited commercial areas in central Tokyo, transactions in the higher price range have been increasing. The *commercial real estate prices to rent ratio* in Japan as a whole has been above the level seen in the mini-bubble period in the late 2000s. Developments in the real estate transaction market continue to warrant close monitoring.

Chart I-5: Real estate-related loans to GDP ratio



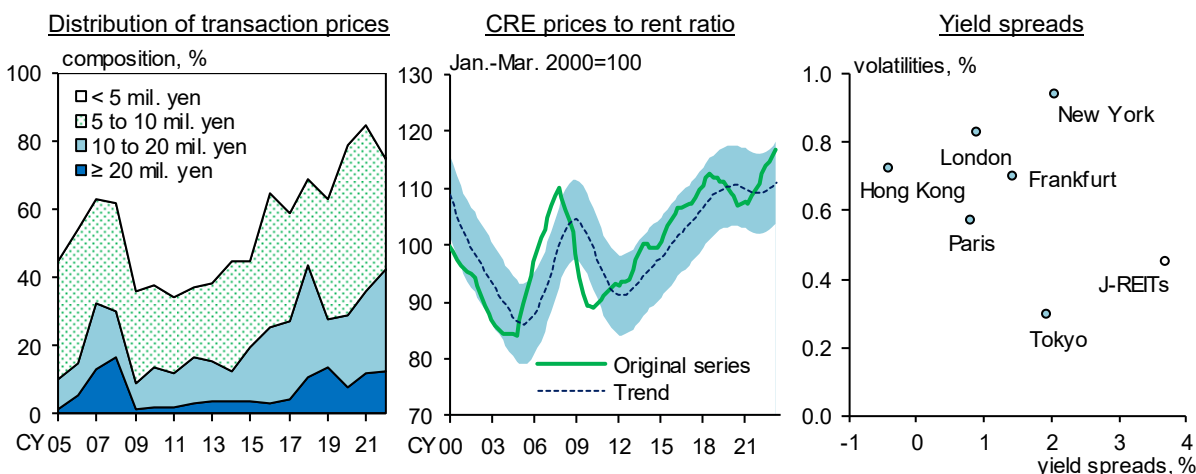
Note: See Chart III-3-8.

Chart I-6: Real estate firms' investment to GDP ratio



Note: See Chart III-3-11.

Chart I-7: Commercial real estate valuations



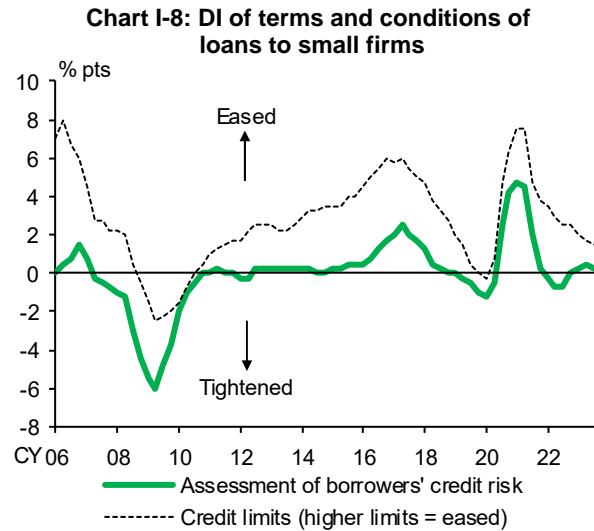
Note: The left-hand chart shows the composition of commercial land transaction prices in the 5 central wards of Tokyo. The middle chart shows the CRE prices to rent ratio across Japan. See Chart III-3-14.

Increased corporate bankruptcies and banks' credit risk → Chapters III-A and IV-A

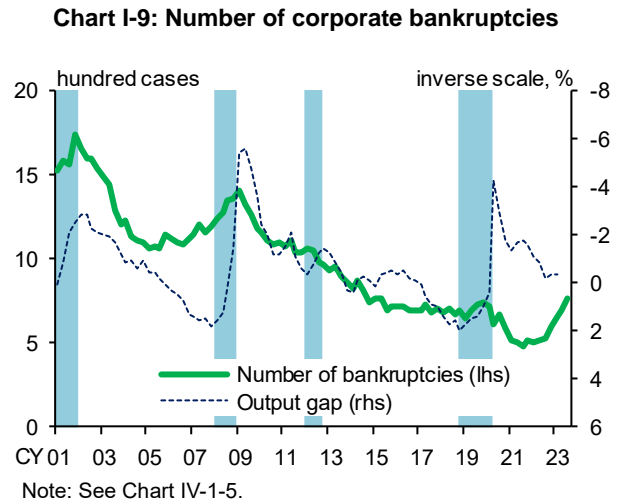
Banks' domestic lending stance has remained active even with firms facing a variety of stresses. Looking at banks' loan conditions, there has been no sustained tightening in the risk assessment of loans to small firms (Chart I-8). Credit lines for small firms remain elevated. Despite these

¹ In Chart I-6, when an index exceeds its upper threshold (shaded area in the chart), it turns "red" in the heat map, which signals overheating.

accommodative financial conditions, bankruptcies of firms have been on the rise since the end of last year (Chart I-9). Firms' defaults, although at a low level on the whole, have been rising, particularly for small-sized firms.

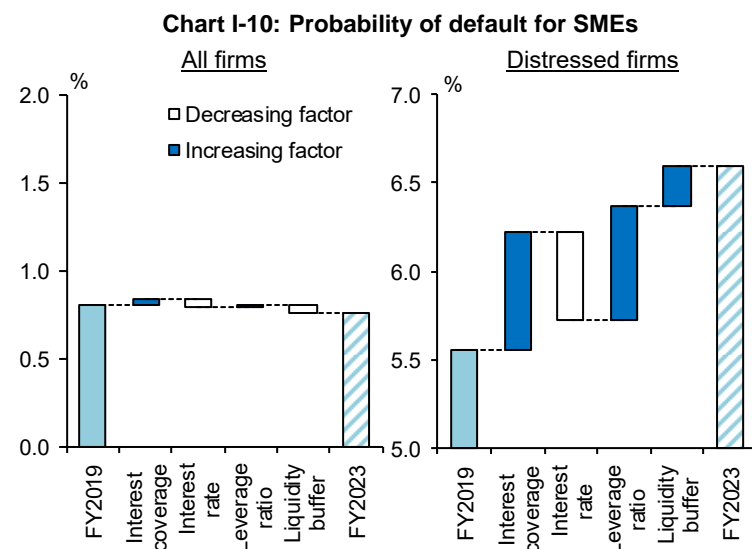


Note: See Chart IV-1-3.

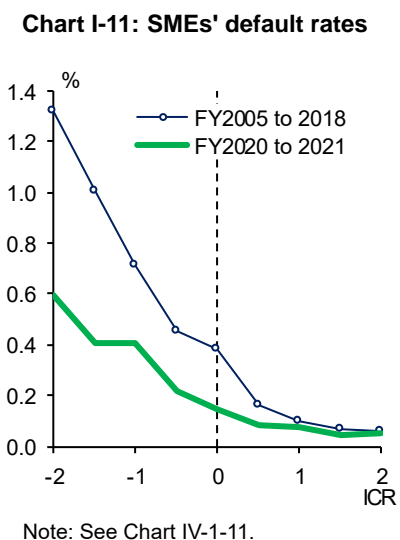


Note: See Chart IV-1-5.

Chart I-10 shows the probability of default estimates for SMEs and the factors behind changes in the probability. For SMEs as a whole, there is no significant difference between the probability of default just before the pandemic and most recently. The increase in the liquidity buffer due to pandemic-related loans and various subsidies restrains defaults. In contrast, for distressed firms, which have experienced a deterioration in their business since before the pandemic, interest payment burden, leverage ratios, and the decline in liquidity buffers push up the probability of default. This suggests that their liquidity buffer has continued to decline and that its effectiveness in curbing defaults has been weakening. The actual default rate in recent years has been pushed down substantially by the strong corporate financing support measures since the outbreak of the pandemic (Chart I-11). With economic activity returning to normal, the default rate is expected to return to its through-the-cycle average.



Note: See Chart IV-1-9.

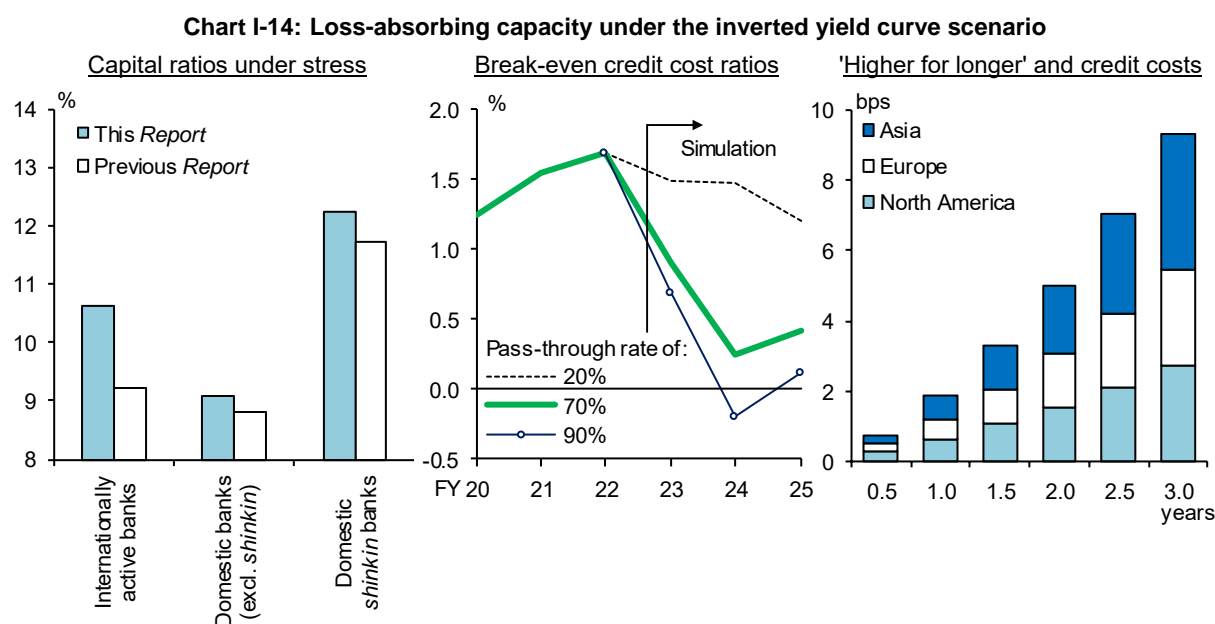
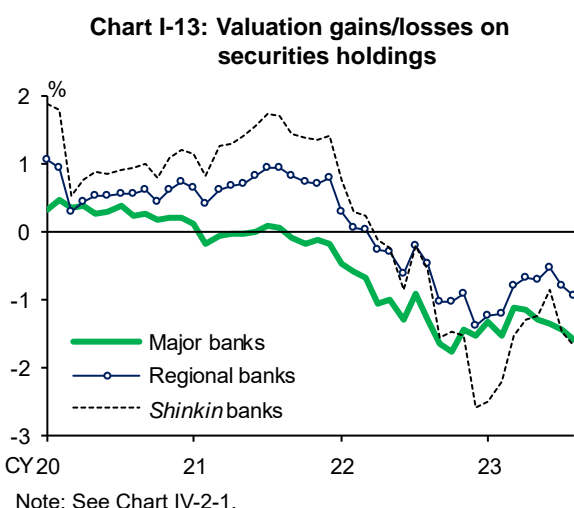
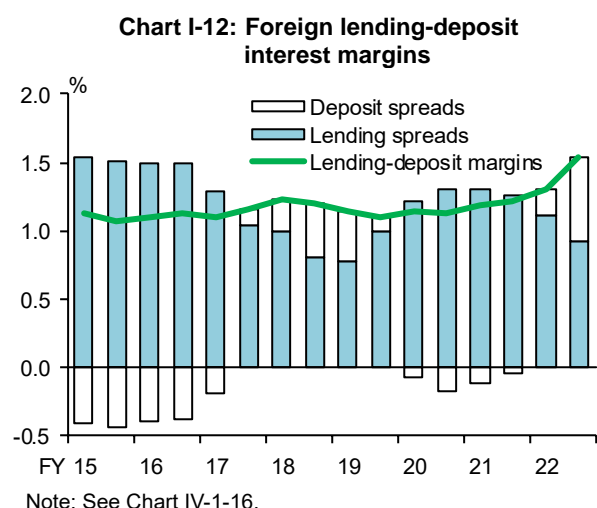


Note: See Chart IV-1-11.

Banks' resilience against higher foreign interest rates → Chapters II-C, IV-A, IV-B, IV-D, and V-B

Looking at banks' foreign currency portfolios, credit risk of foreign loans has been kept low even amid the global tightening of financial conditions. Foreign lending-deposit interest margins have continued to improve together with the rise in market interest rates, leading to an improvement in profit buffers, which represent one element of banks' loss-absorbing capacity (Chart I-12). In terms of securities investment, the increase in banks' valuation losses on securities, especially foreign bonds, has been limited compared to the beginning of this year (Chart I-13). In particular, banks that have actively rebalanced have reconfigured their portfolios, increasing their holdings of bonds with higher yields and shorter average durations. At the same time, these banks have strengthened their hedging against the risk of higher interest rates.

The impact of the rebalancing of foreign currency portfolios can also be seen in the results of the macro stress testing. Banks are more resilient against the stress of foreign yield curves remaining



- Note:
1. The left-hand chart shows the capital adequacy ratios at the end of the simulation period. See Chart V-2-5.
 2. The middle chart shows the ratios at which foreign credit costs equal foreign net interest income. See Chart V-2-9.
 3. The right-hand chart shows the cumulative foreign credit cost ratios corresponding to the duration of higher foreign interest rates. See Chart V-2-11.

inverted for a long time, compared to the simulation results in the previous *Report*. For all types of banks, capital adequacy ratios in the event of stress are higher than in the previous *Report* (left panel of Chart I-14). The share of banks for which room for realizing gains (net valuation gains/losses on securities holdings) turns negative has declined from 80 percent in the previous *Report* to close to 50 percent in this *Report*.

It should be noted that there remain downside risks to loss-absorbing capacity during the simulation period. If there is additional stress on the foreign currency deposit market and the interest rate pass-through to deposit funding rises above the historical average of 70 percent, the break-even credit cost ratio at the end of the rising interest rates phase will be negative (middle panel of Chart I-14). This means that banks cannot absorb foreign credit costs through foreign net interest income. In order to both reduce funding liquidity risk and ensure sufficient loss-absorbing capacity, it is important for banks to secure stickier deposits. Moreover, a situation of foreign interest rates remaining higher for longer leads to a deterioration not only in banks' but also firms' financial conditions. For loans to North America, Europe, and Asia, credit cost ratios increase non-linearly with higher interest rates staying for longer (right panel of Chart I-14). Such credit risks are pronounced in loans to Asia, where firms with high financial leverage and low interest coverage ratios (ICRs) are concentrated.

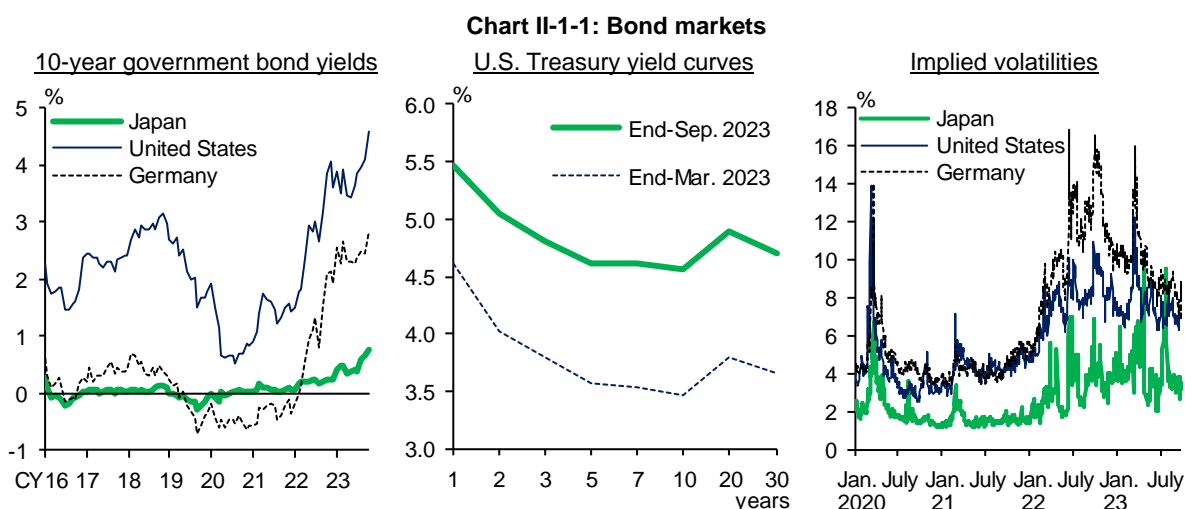
The Bank of Japan will promote financial institutions' initiatives to address these potential vulnerabilities through on-site examinations and off-site monitoring. It will continue to closely monitor the impact of various risk-taking moves by financial institutions on the financial system from a macroprudential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

II. Risks observed in financial and capital markets

- In global financial markets, prices of most risky assets rose slightly over the first half of fiscal 2023.² In the United States, market sentiment has continued to improve, mainly on the back of solid corporate financial results. Concerns over the financial sector in the United States and Europe, which heightened in March 2023, have become subdued.
- Japanese financial markets have been generally calm. Under Quantitative and Qualitative Monetary Easing (QQE) with Yield Curve Control, short- and long-term interest rates have been in line with the current guideline for market operations. The liquidity and functioning of Japanese government bond (JGB) markets have been improving, although they have generally remained low. In the corporate bond market, yield spreads in both the primary and secondary markets have narrowed somewhat. Japanese stock prices have increased substantially compared to those in the United States and Europe, with market attention being paid to the undervaluation of Japanese stock prices.
- However, uncertainty about financial markets continues to be high. There remain concerns in global financial markets over whether it is possible to contain inflation and maintain economic growth simultaneously. In this situation, attention should continue to be paid to the possibility that global financial conditions will tighten further through repricing of assets and outflows of funds from emerging market economies.

A. Global financial markets

In global financial markets, prices of most risky assets rose slightly over the first half of fiscal 2023. In the United States, market sentiment has continued to improve on the back of solid corporate financial results, resilient economic indicators, and a decline in the inflation rate. Concerns over the financial sector in the United States and Europe, which heightened in March 2023, have become subdued. However, market attention has continued to be drawn to uncertainties over the U.S. and European monetary policies, as well as the outlook for the global economy. Moreover, the markets have continued to show some nervousness, as seen in implied volatilities of interest rates staying high.



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 September 2023 and end-September 2023, respectively.
Source: Bloomberg.

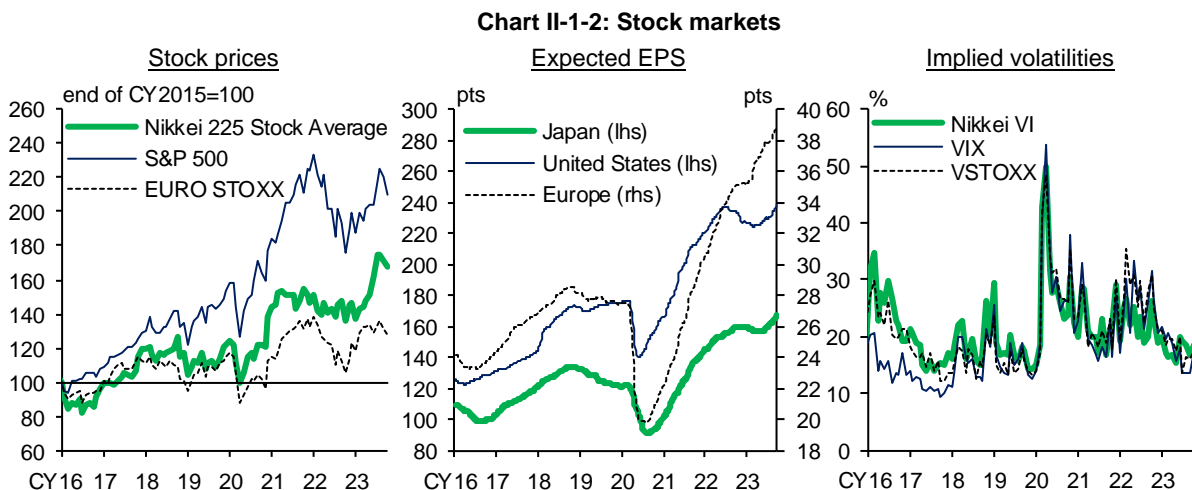
² In Japan, the fiscal year starts in April and ends in March of the following year.

U.S. and European bond markets

Long-term interest rates in the United States have increased significantly, to over 4 percent again, on the back of resilient economic indicators (Chart II-1-1). The yield curve for U.S. Treasuries has remained inverted, partly owing to remarks by Federal Reserve officials highlighting the need to contain inflation. Long-term interest rates in Europe have also risen. Implied volatilities of government bond futures have stayed high in both the United States and Europe, with market attention being paid to uncertainty about the future path of monetary policy.

U.S. and European stock markets

Stock prices in the United States rose toward the summer due to solid corporate financial results, resilient economic indicators, and the decline in the inflation rate. They subsequently have declined slightly due to the rise in long-term interest rates (Chart II-1-2). Expected earnings per share (EPS) -- which previously weakened somewhat -- have gone up due to market expectations for improvement in corporate profits. In particular, stock prices of high-tech firms and semiconductor firms have risen significantly, owing to market expectations for a spread of generative artificial intelligence (AI) and other new technologies. On the other hand, stock prices in Europe have been more or less flat, restrained by the slowdown in the European economy and the deceleration in the pace of pick-up in the Chinese economy. Meanwhile, implied volatilities of stock prices have been generally stable both in the United States and Europe.



Note: 1. In the middle chart, the data for Japan, United States, and Europe indicate expected EPS for the next 12 months of the TOPIX, the S&P 500, and the EURO STOXX, respectively. 4-week backward moving averages.
 2. Latest data for the left- and right-hand charts are as of September 2023. Latest data for the middle chart are as of end-September 2023.
 Source: Bloomberg; Refinitiv Datastream.

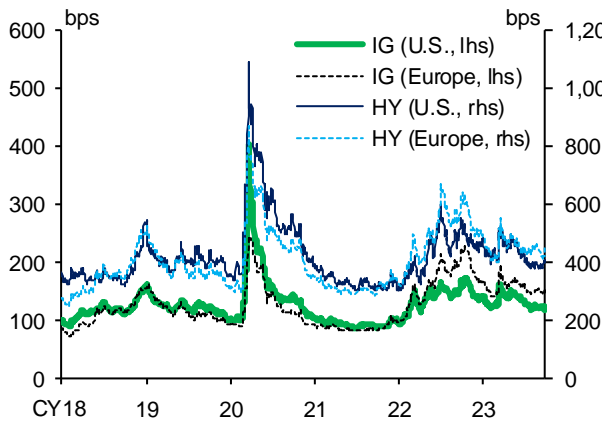
U.S. and European credit markets

In U.S. and European credit markets, credit spreads on both investment-grade bonds and high-yield bonds narrowed somewhat over the first half of fiscal 2023 (Chart II-1-3). Credit spreads in the United States, particularly those in the financial sector, temporarily widened in response to the U.S. bank failures in March and May 2023 but subsequently have been stable. The distress ratio -- the ratio of high-yield bonds having a yield spread that exceeds 10 percent, which indicates the ratio of low-credit bonds -- has stayed at the historical average level. However, the default rate has increased in the U.S. credit market due to the effects of past monetary tightening (Chart II-1-4). Moreover, some market participants have been concerned about a further rise in the default rate.

II. Risks observed in financial and capital markets

A. Global financial markets

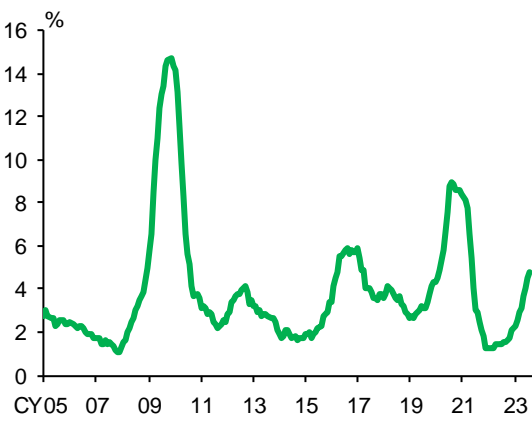
Chart II-1-3: Credit spreads on corporate bonds



Note: "IG" and "HY" indicate investment-grade bonds and high-yield bonds, respectively. Latest data as of end-September 2023.

Source: ICE Data Indices, LLC.

Chart II-1-4: U.S. actual default rates



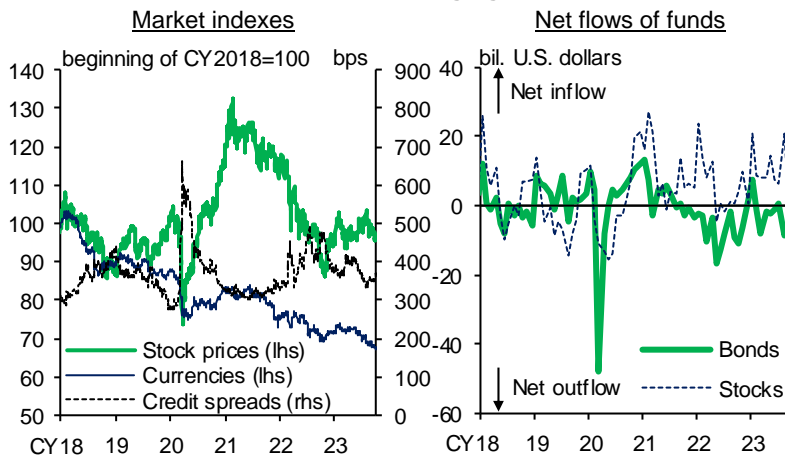
Note: The figures indicate trailing 12-month default rates of speculative-grade corporate bonds and loans, etc. Latest data as of August 2023.

Source: Moody's Investors Service.

Emerging markets and commodity markets

Market sentiment has also continued to improve in emerging markets. Stock prices have been firm, and credit spreads of government bonds have narrowed somewhat (Chart II-1-5). Looking at net flows of emerging market funds, bond funds saw small net outflows, with market attention being paid to monetary tightening in the United States and Europe. Equity funds continued to see net inflows. Meanwhile, currencies in emerging markets have depreciated somewhat, partly due to the rise in U.S. interest rates.

Chart II-1-5: Emerging markets

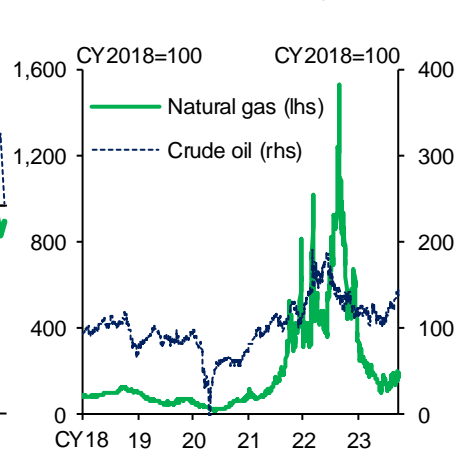


Note: 1. In the left-hand chart, "Stock prices," "Currencies," and "Credit spreads" indicate the MSCI EM Local Index, the J.P. Morgan EMCI Index, and yield spreads of the EMBI Global over U.S. Treasuries, respectively.

2. Latest data for the left- and right-hand charts are as of end-September 2023 and September 2023, respectively.

Source: Bloomberg; EPFR; Haver Analytics.

Chart II-1-6: Commodity prices



Note: "Natural gas" and "Crude oil" indicate Dutch TTF futures and WTI crude oil futures, respectively. Latest data as of end-September 2023.

Source: Bloomberg.

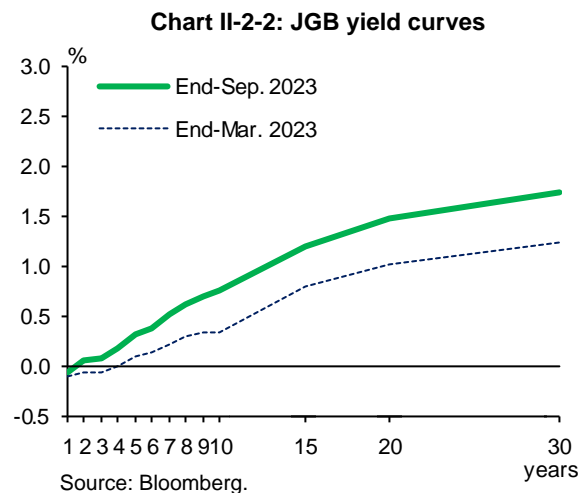
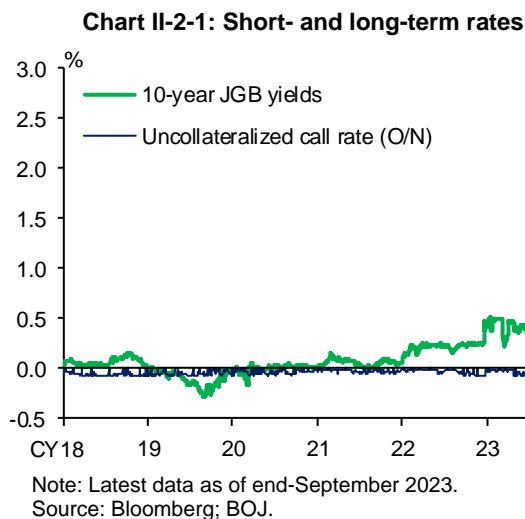
In commodity markets, prices of natural gas have declined somewhat against the backdrop of high levels of inventories in Europe (Chart II-1-6). In the meantime, prices of crude oil temporarily went down, reflecting the deceleration in the pace of pick-up in the Chinese economy. However, they increased over the first half of fiscal 2023 with additional oil production cuts by oil-producing economies.

B. Japanese financial markets

Japanese financial markets have been generally calm. Under QQE with Yield Curve Control, short- and long-term interest rates have been in line with the current guideline for market operations, in which the short-term policy interest rate is set at minus 0.1 percent and the target level of 10-year JGB yields is around zero percent. The liquidity and functioning of JGB markets have been improving, although they have generally remained low. In the corporate bond market, yield spreads in both the primary and secondary markets have narrowed somewhat. Japanese stock prices have increased substantially compared to those in the United States and Europe, with market attention being paid to the undervaluation of Japanese stock prices.

Short- and long-term interest rates

Short- and long-term interest rates have been in line with the current guideline for market operations, in which the short-term policy interest rate is set at minus 0.1 percent and the target level of 10-year JGB yields is around zero percent (Chart II-2-1). Long-term interest rates rose after the Bank's decision in July to conduct yield curve control with greater flexibility.³ The yield curve for JGBs has shifted upward, mainly in the long- and super-long-term zones (Chart II-2-2). Meanwhile, implied volatility of JGB futures has been high, albeit with fluctuations, partly reflecting speculation over the future path of monetary policy (Chart II-1-1).



Liquidity and functioning of JGB markets

The liquidity and functioning of JGB markets have been improving, although they have generally remained low.⁴ According to the *Bond Market Survey*, the diffusion index for the degree of bond market functioning from the surveyed institutions' viewpoint has improved from the bottom recorded in the February 2023 survey (Chart II-2-3).⁵ With regard to developments in interest rates, the

³ The Bank decided to conduct yield curve control with greater flexibility in July 2023. Specifically, the Bank will continue to allow 10-year JGB yields to fluctuate in the range of around plus and minus 0.5 percentage points from the target level while regarding the upper and lower bounds of the range as references, not as rigid limits, in its market operations. Accordingly, it will allow the yields to move beyond the range depending on market conditions.

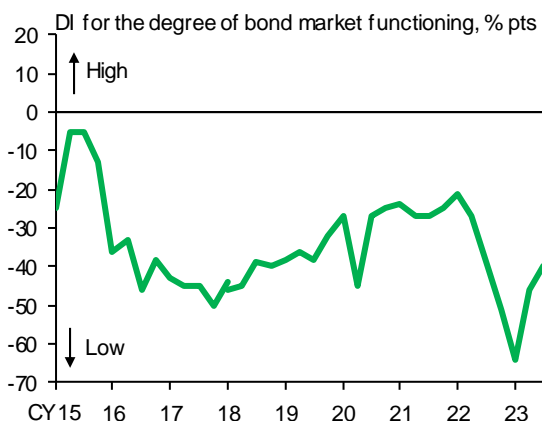
⁴ See "Liquidity Indicators in the JGB Markets" on the Bank's website. The Financial Markets Department of the Bank generally updates and releases liquidity indicators of the JGB markets on a quarterly basis.

⁵ Participants of the 17th round of the "Bond Market Group" meetings held on June 5 and 6, 2023 noted that the degree of functioning of the JGB market had improved with distortions on the yield curve decreasing, and that the functioning was recovering from the situation where it was hard to make deals.

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

shape of the yield curve for JGBs has been smooth in general. Relative relationships among interest rates of bonds with different maturities have improved, eliminating yield differentials among issues with the same remaining maturity (Chart II-2-4). Although liquidity indicators in the JGB futures market, such as market depth and resiliency, have remained low, they have been improving recently (Chart II-2-5). Inter-dealer transaction volume for cash JGBs has stayed low, but it has increased somewhat compared with a while ago.

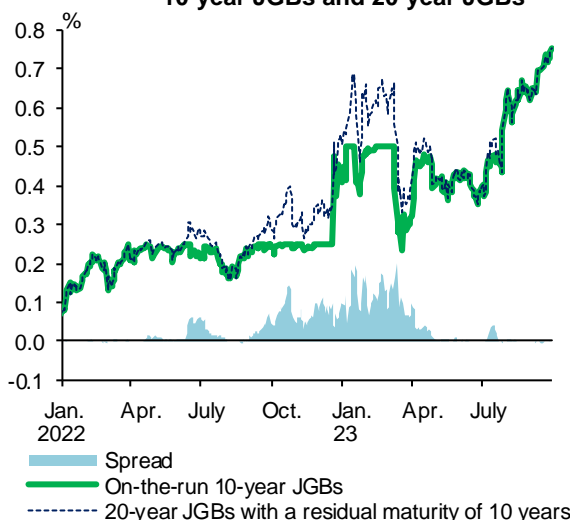
Chart II-2-3: Bond market survey



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 2023 survey.

Source: BOJ.

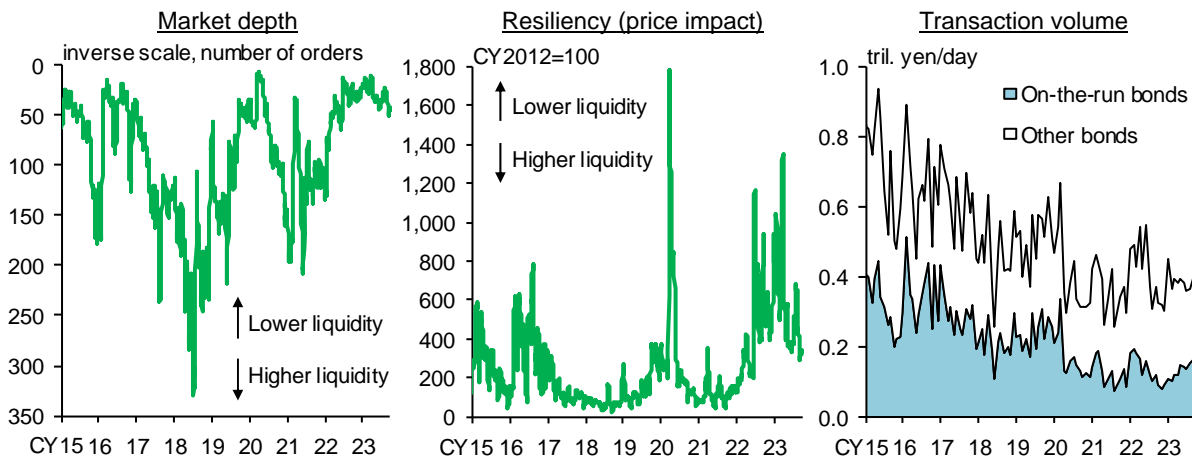
Chart II-2-4: Yield spread between on-the-run 10-year JGBs and 20-year JGBs



Note: Based on the trading reference statistics of the JSDA. Compound yield. Latest data as of end-September 2023.

Source: JSDA; QUICK.

Chart II-2-5: Liquidity indicators in JGB markets



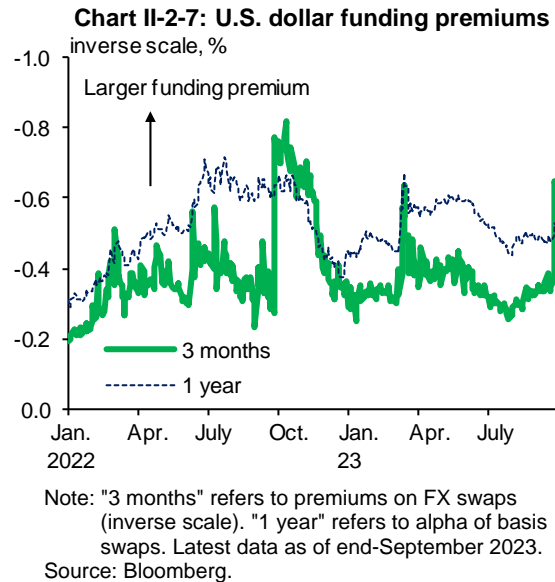
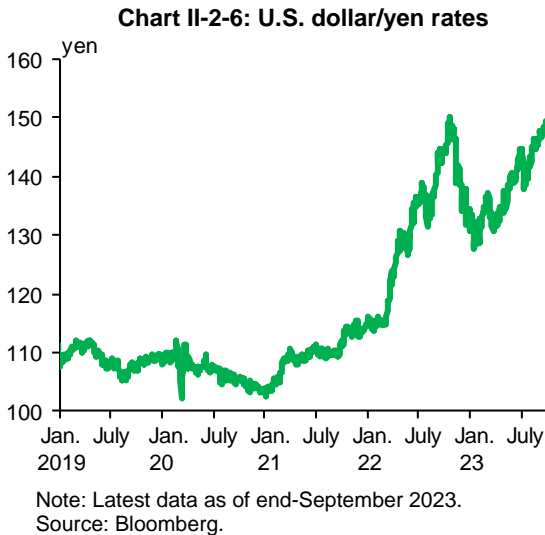
Note: 1. In the left-hand chart, the figures are the number of orders for JGB futures at the best-ask price with 1-minute frequency (median for each business day). In the middle chart, the figures indicate the price change per unit volume of transactions for JGB futures for each business day. 10-day backward moving averages. Latest data as of end-September 2023.
 2. In the right-hand chart, the figures indicate 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 2023.

Source: Japan Bond Trading; Nikkei Inc., "NIKKEI NEEDS"; QUICK.

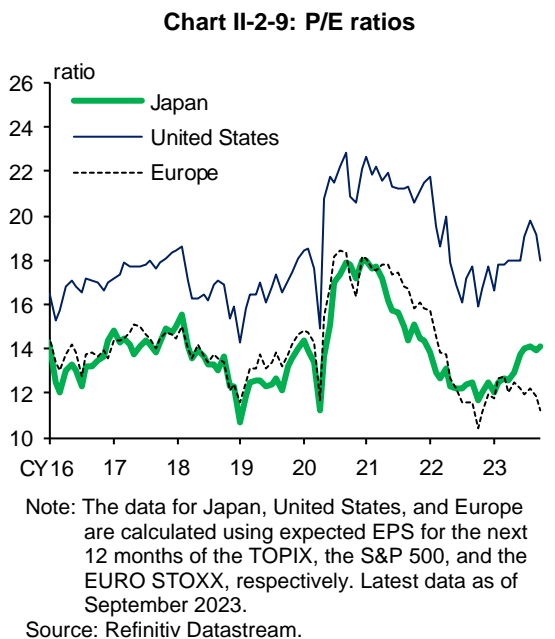
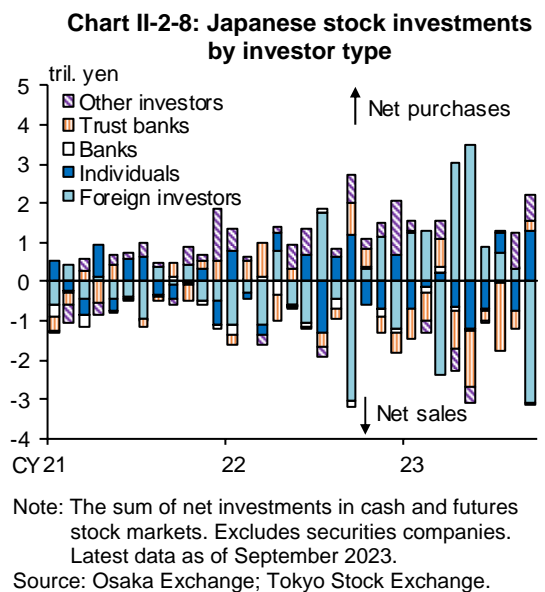
It is not straightforward, however, to assess these indicators in the short term, because they tend to be volatile and are affected by developments in foreign bond markets. Close attention should continue to be paid to developments in market functioning under yield curve control.

FX, stock, and credit markets

In FX markets, the yen has depreciated against the U.S. dollar, with market attention being paid to the yield differential between Japan and the United States (Chart II-2-6). Dollar funding premiums in the FX swap market widened after the U.S. bank failures in March 2023 but subsequently have been stable (Chart II-2-7).⁶



In capital markets, Japanese stock prices have increased substantially due to solid corporate financial results, as well as the yen's depreciation (Chart II-1-2). In July, the Nikkei 225 Stock Average hit a record high in the post-bubble period, with stock prices rising across sectors. Prices of export-related stocks went up owing to the yen's depreciation, and those of banks increased as their payouts to shareholders and an increase in domestic interest rates were favored by market participants. With attention being paid to the undervaluation of Japanese stock prices compared to those overseas, capital flows of foreign investors have driven up Japanese stock prices (Chart II-



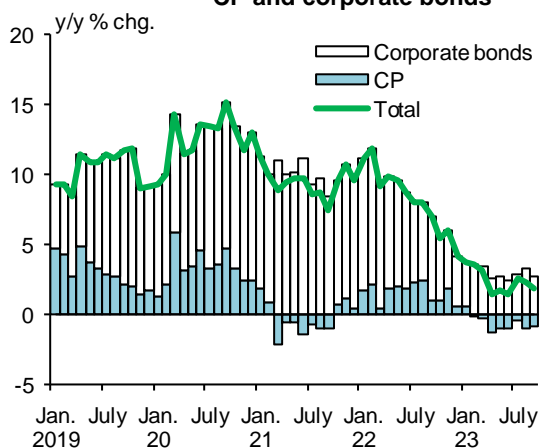
⁶ The widening of 3-month dollar funding premiums toward the end of September reflected transactions conducted in view of the year-end.

II. Risks observed in financial and capital markets
 C. Risks to financial markets

2-8). More recently, the degree of undervaluation has receded, as evidenced by price-earnings (P/E) ratios having risen to the historical average level (Chart II-2-9).

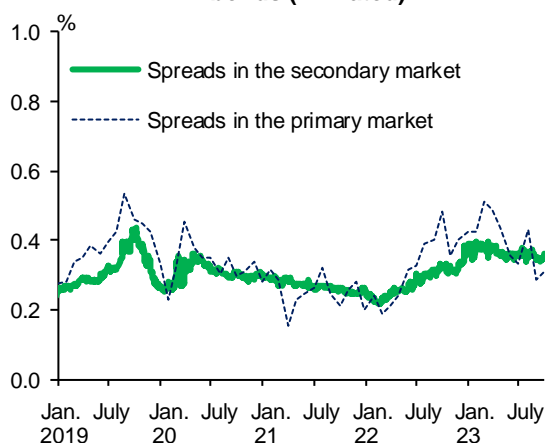
The outstanding amounts of CP and corporate bonds have continued to increase (Chart II-2-10). By maturity, issuance of long-term corporate bonds has picked up. However, the pace of increase in the outstanding amounts of CP and corporate bonds has decelerated, as issuance by energy-related firms has become subdued in response to a pause in raw material input cost increases. In this situation, issuance rates for CP have been extremely low. In the corporate bond market, yield spreads in both the primary and secondary markets have narrowed somewhat, with improvements in distortions on the yield curve and in the supply and demand conditions (Chart II-2-11).

Chart II-2-10: Outstanding amounts of CP and corporate bonds



Note: Excludes those issued by financial institutions.
 Latest data as of end-September 2023.
 Source: I-N Information Systems; JASDEC.

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 2023.
 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 2023.
 Source: Bloomberg; Capital Eye; I-N Information Systems; JSDA; QUICK.

C. Risks to financial markets

This section presents an overview of risks to global financial markets and outlines risks associated with domestic and foreign bond investment, to which financial institutions are paying attention.

Risks to global financial markets

Uncertainty about financial markets remains high. There have been concerns in global financial markets over whether it is possible to contain inflation and maintain economic growth simultaneously, particularly in the United States and Europe. With sticky inflationary pressure remaining, market participants have been wary of continuing monetary tightening and higher long-term interest rates.

In the stock and credit markets, there remain concerns over the impact of U.S. and European monetary tightening on financial conditions and funding of firms with low credit ratings. In the U.S. and European real estate industries, there have been concerns over developments in commercial

real estate, reflecting the deterioration in the funding environment and weakening supply-demand conditions for office buildings due to monetary tightening. In the U.S. banking industry, markets have paid attention to the impact of rising deposit funding costs and the downgrading of mainly medium-sized and small banks on their future business performance.

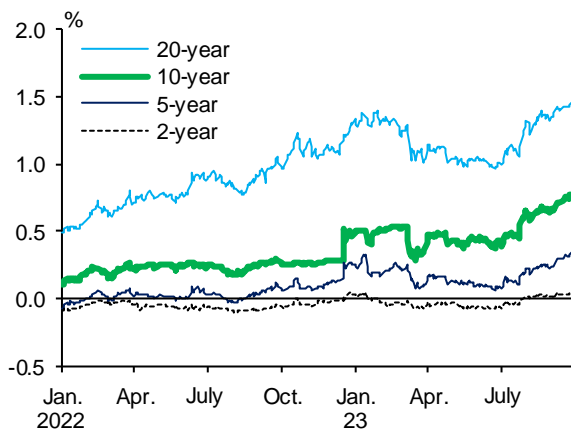
In emerging markets, although concerns over capital outflows have abated, future developments continue to warrant close monitoring. In international commodity markets, attention needs to be paid to the impact of the situation in Ukraine and the slow recovery of the Chinese economy on commodity and grain prices.

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

Risks to domestic and foreign bond investment

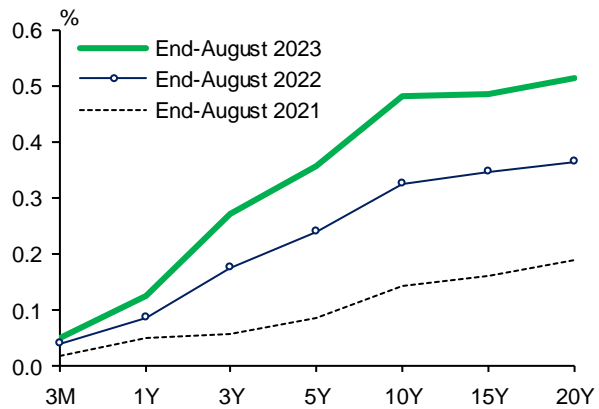
In the domestic bond market, long-term interest rates have risen slightly since this summer (Chart II-3-1). Expectations of higher interest rates and the risk of a decline in bond prices have also heightened somewhat. Under these circumstances, interest rate volatility has risen, especially for longer maturities, which could lead to an increase in the value at risk (VaR) of yen-denominated bonds (Chart II-3-2). An increase in valuation losses on yen-denominated bonds could lead to a decline in economic capital allocated to financial institutions' market positions. Moreover, a rise in VaR and valuation losses would also lead to an increase in the ratio of allocated capital utilization. These factors would make it more difficult for financial institutions to hold yen-denominated bonds and adjust positions in a flexible manner.

Chart II-3-1: Government bond yields by maturity



Note: Latest data as of end-September 2023.
Source: Ministry of Finance.

Chart II-3-2: Volatility curve of yen interest rate



Note: Historical volatility of swap rates with the past 1-year observation period.
Source: Bloomberg.

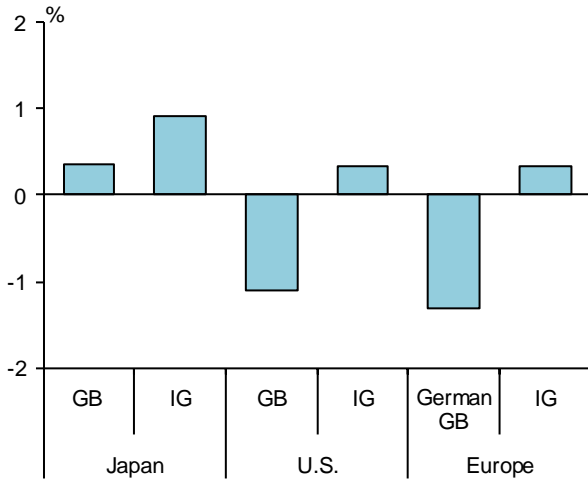
In foreign bond markets, yield curves in the United States and Europe have become more inverted (Chart II-1-1). Against this background, it has become more difficult for financial institutions to maintain positive interest margins on foreign government bond investments (Chart II-3-3). In addition, higher short-term foreign currency hedging costs have also contributed to this difficulty (Chart II-3-4). If yield curves remain inverted for longer, financial institutions will be more likely to reduce their foreign bond positions to mitigate the risk of negative interest margins.

Amid the heightening risk of negative interest margins on foreign government bondholdings, credit investment has become relatively attractive for investors (Chart II-3-3). This could be a trigger for financial institutions to increase products with market credit risk. The possible impact of these

II. Risks observed in financial and capital markets
 C. Risks to financial markets

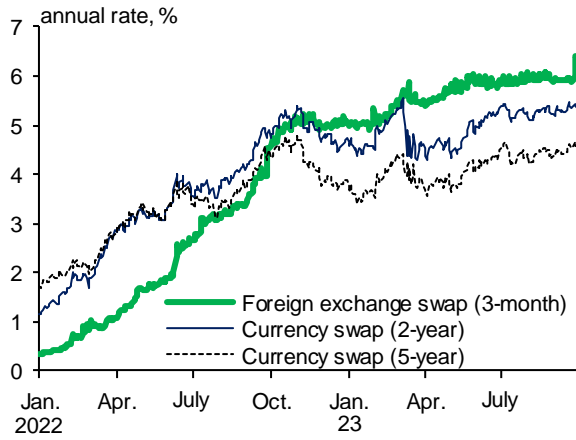
market developments on Japanese financial institutions' bond investment is examined in Section B of Chapter IV.

Chart II-3-3: Bond interest margins by currency



Note: "GB" and "IG" indicate 5-year government bonds and 4- to 6-year investment-grade bonds, respectively. U.S. and Europe take into account the currency hedging costs. Data as of end-September 2023. Source: Bloomberg; ICE Data Indices, LLC; QUICK; Refinitiv Eikon.

Chart II-3-4: Dollar funding cost



Note: Latest data as of end-September 2023. Source: Refinitiv Eikon.

III. Financial intermediation

- Financial intermediation has continued its smooth functioning in Japan. Banks' lending stance has remained active. As for domestic loans, banks have met the demand for real estate-related loans, as well as that for working capital amid the recovery in economic activity and higher energy and raw material input costs. In their foreign lending, however, major banks have been more selective amid concerns over downside risks to foreign economies. Meanwhile, banks have continued to make securities investment in a risk-conservative manner, reflecting the rise in domestic and foreign interest rates.
- Assets under management held by non-bank financial intermediaries (NBFIs) have remained on an uptrend. However, recent developments show some differences by business within the non-bank financial sector. The investment positions of insurance companies and pension funds have leveled off, due mainly to a reduction in foreign bondholdings.
- 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 due to the rebalancing of private debt and economic activity. The contribution of active real investment due to leverage and asset price increases has been limited compared to the previous episode when financial imbalances built up. However, along with the rise in private debt, borrowing terms have become longer. In addition, in the real estate market, where lending has continued to increase, valuations of some properties seem relatively high.

A. Financial intermediation by the banking sector

1. Loans

The annual growth rate of domestic loans by private banks, despite decelerating somewhat, has remained around 3 percent (Chart III-1-1).^{7,8} This increase continues to be driven mainly by demand for working capital amid the recovery in economic activity and higher energy and raw material input costs. Major banks have seen a weakening of demand for working capital recently, reflecting the decline in import goods prices. Regional and *shinkin* banks have seen lending decline as repayments on effectively interest-free and unsecured loans (so-called zero-zero loans) began in full.

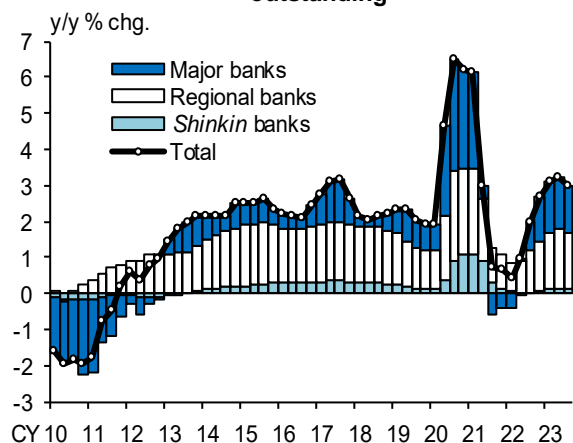
Meanwhile, banks' lending stance continues to be active. Major banks have been increasing their lending while ensuring loan profitability. Regional banks are also planning to increase lending. Although the DI of banks' lending standards has declined somewhat (Chart III-1-2), 90 percent of banks have been keeping their active lending stance.

⁷ Corporate loans supported by public financing -- defined as the sum of loans by government-affiliated banks and loans by private banks guaranteed by credit guarantee corporations -- have been more or less flat since last year. While the outstanding amount of zero-zero loans has decreased, there has been demand for loans due to higher input costs.

⁸ The annual increase in the yen-denominated value of foreign currency-denominated loans (foreign currency-denominated impact loans) is attributable to the effect of the depreciation of the yen.

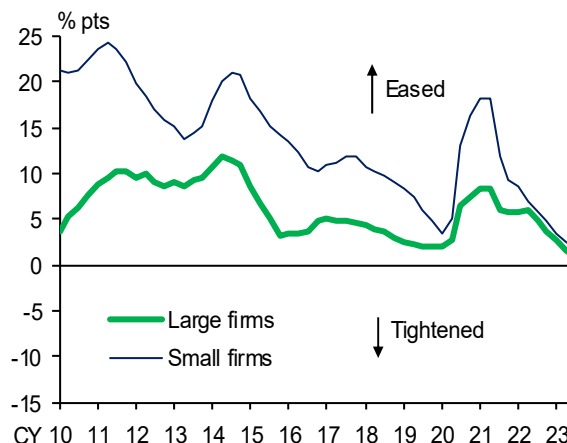
III. Financial intermediation
A. Financial intermediation by the banking sector

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



Note: Latest data as of July-August 2023.
Source: BOJ.

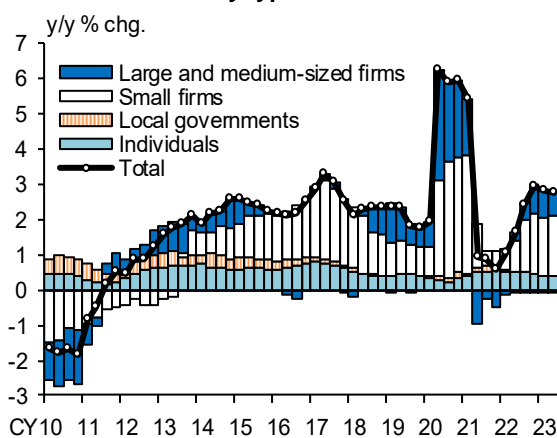
Chart III-1-2: DI of banks' credit standards



Note: 4-quarter backward moving averages. Latest data as of July 2023.
Source: BOJ.

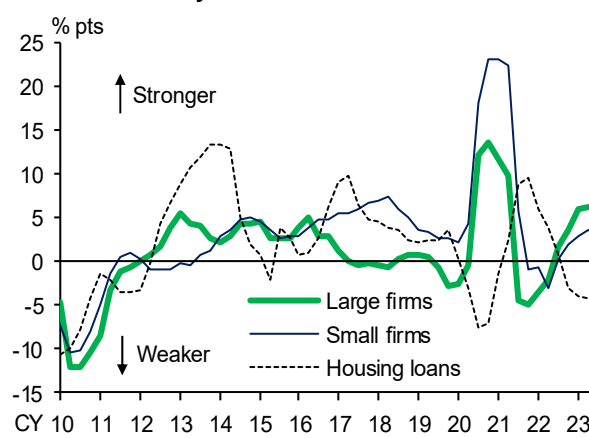
Loans to both large and medium-sized firms and small firms have continued to increase (Chart III-1-3). Firms' demand for loans as perceived by banks has also continued to rise (Chart III-1-4). However, there is heterogeneity in firms' demand for loans. Among large firms, which have made progress in passing on higher energy and raw material input costs, the growth pace in demand for working capital has started to slow. Among small firms, which have struggled to pass on such costs, there has been demand for additional working capital. With regard to loans to individuals, the pace of increase has slowed moderately due to the decline in housing loan demand.

Chart III-1-3: Banks' loans outstanding by type of borrower



Note: Loans to banks and insurance companies are excluded. Latest data as of end-June 2023.
Source: BOJ.

Chart III-1-4: DI of demand for loans as perceived by banks



Note: 4-quarter backward moving averages. Latest data as of July 2023.
Source: BOJ.

Loans by type of borrower

Loans to real estate businesses have grown at an increasing rate (Chart III-1-5). Growth in loans to the manufacturing as well as wholesale industries has decelerated, partly because demand for working capital has abated, reflecting the decline in import goods prices. As for working capital, while the loan growth rate has decelerated for large and medium-sized firms, it has been unchanged for small firms (Chart III-1-6). Meanwhile, loans for business fixed investment have increased moderately. 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.

Chart III-1-5: Corporate loans outstanding by industry

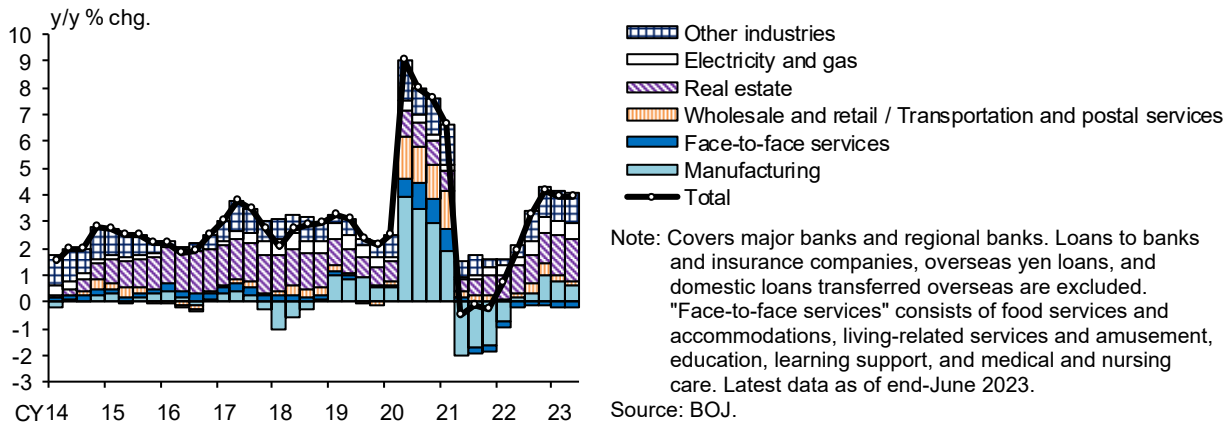
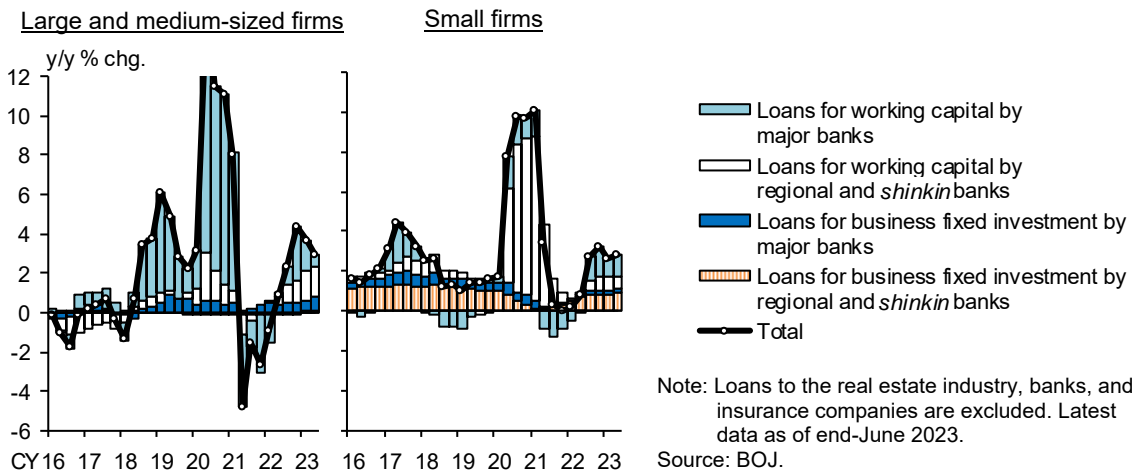


Chart III-1-6: Corporate loans outstanding by type of loan



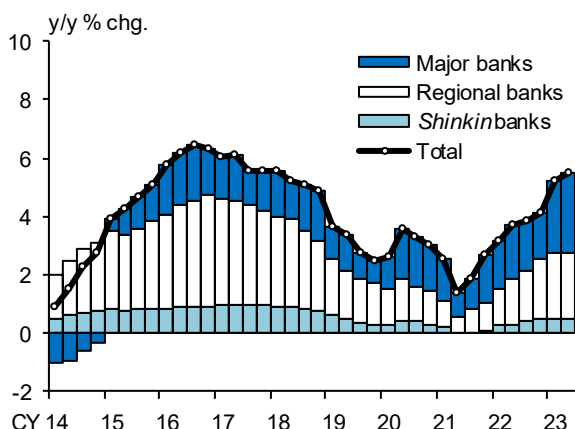
Real estate-related loans

Loans to real estate businesses have grown at an increasing rate at both major and regional banks (Chart III-1-7). At major banks, loans to real estate investment funds with relatively high lending margins and loans to real estate investment trusts (REITs) mainly have contributed to this increase (Chart III-1-8, where the former is represented by "SPCs" and the latter is included in "small firms"). Major banks have actively met solid demand for funds from foreign investors while managing credit exposures cautiously based on current real estate market conditions and past periods of market stress. At regional banks, loans to real estate investment funds have been on an uptrend (Chart III-1-9).⁹ Loans to real estate leasing businesses, which had decelerated temporarily during the pandemic, have been increasing at a faster pace again. Moreover, real estate sales agents' demand for funds, which is included in "other" in Chart III-1-9, has also been on the rise. Real estate transactions have become active not only in the Tokyo metropolitan area but also in local cities.

⁹ 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.

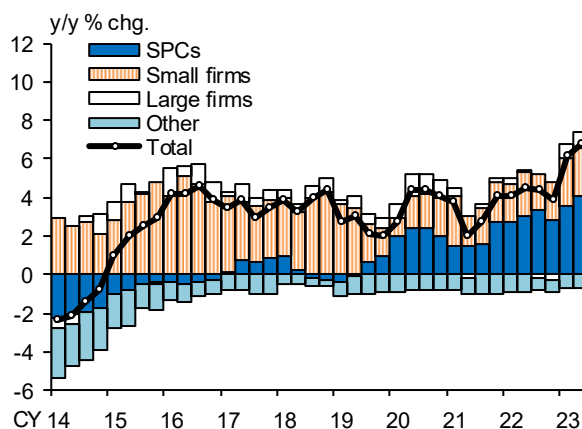
III. Financial intermediation
A. Financial intermediation by the banking sector

Chart III-1-7: Banks' real estate loans outstanding



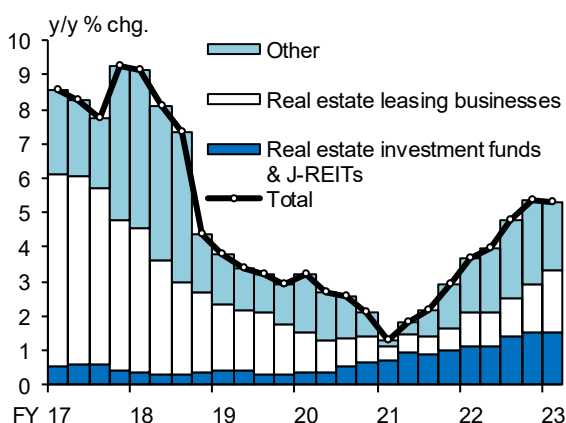
Note: Latest data as of end-June 2023.
Source: BOJ.

Chart III-1-8: Real estate loans by major banks



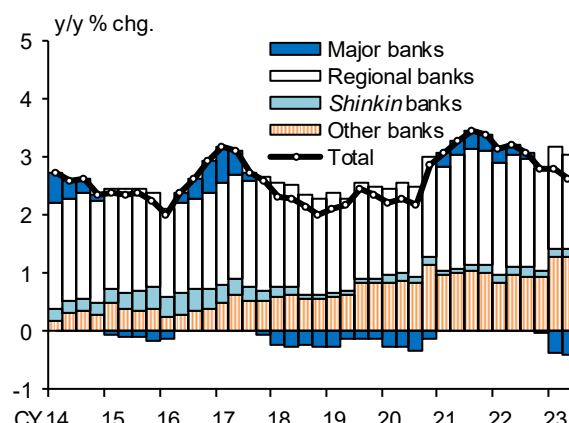
Note: "Small firms" includes J-REITs. Latest data as of end-June 2023.
Source: BOJ.

Chart III-1-9: 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 2023.
Source: BOJ.

Chart III-1-10: Banks' housing loans outstanding



Note: "Other banks" covers domestically licensed banks but excludes major banks and regional banks. Latest data as of end-June 2023.
Source: BOJ.

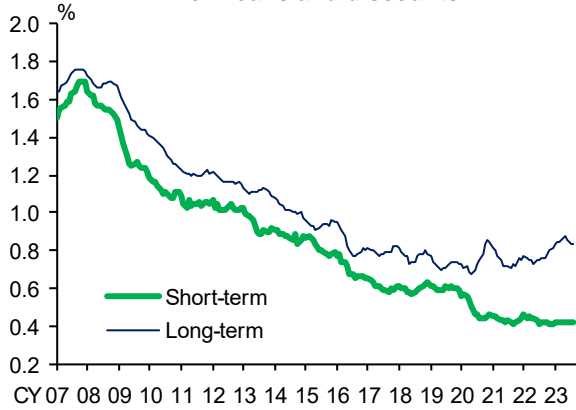
Housing loans, which account for a large share of loans to individuals, have continued to grow at around 3 percent (Chart III-1-10). The increase in the outstanding amount has been led by internet-only banks (included in "other banks" in Chart III-1-10), which offer highly preferential interest rates. However, the growth rate for overall banks, after reaching a peak in 2021, has decelerated due to the slowdown in housing demand, which partly reflects the rise in property prices. At major banks, partly because of their greater focus on profitability and resultant selective lending stance, housing loans have started to decline.

Loan interest rates

With regard to banks' average contract interest rates on new loans and discounts, short-term lending rates have been hovering around record low levels (Chart III-1-11). Long-term lending rates have increased somewhat, mainly reflecting a rise in fixed interest rates for corporate loans. Meanwhile, interest rates on floating-rate housing loans, which account for 80 percent of new loans, have been more or less flat (Chart III-1-12). On the other hand, interest rates on fixed-rate housing loans have risen in line with long-term interest rates, which are the base rates for these loans. The

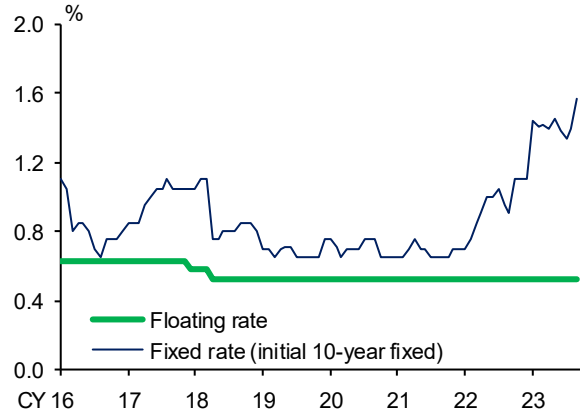
difference between interest rates on floating-rate and fixed-rate housing loans has become even larger.

Chart III-1-11: Average contract interest rates on new loans and discounts



Note: Covers domestically licensed banks. 6-month backward moving averages. Latest data as of August 2023.
Source: BOJ.

Chart III-1-12: Interest rates on housing loans

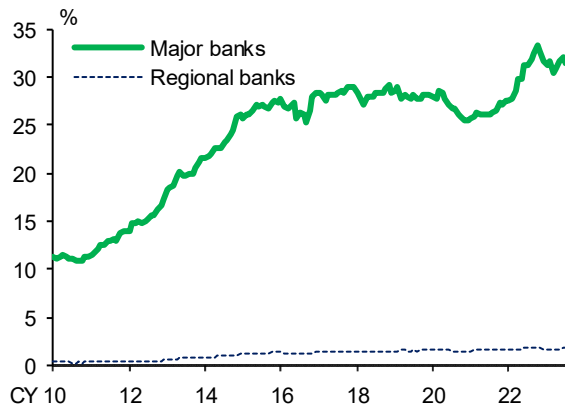


Note: Shows medians of some major banks (preferential rates are taken into account). Latest data as of September 2023.
Source: Published accounts of each bank.

Foreign loans

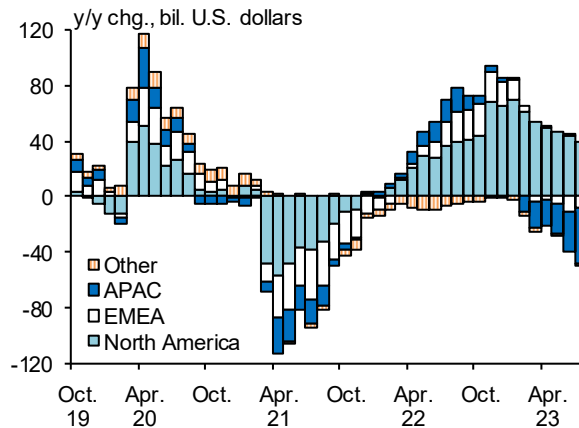
With the share of foreign loans reaching over 30 percent, major banks' loan portfolios have become more susceptible to foreign financial and economic conditions (Chart III-1-13). Against this background, major banks have become more selective in their foreign lending. Concerns over downside risks to foreign economies have also contributed to such lending stance. By region, loans to the Europe, Middle East, and Africa (EMEA) and Asia-Pacific (APAC) regions have started to decline (Chart III-1-14). On the demand side, loans to commodity traders, which had been increasing on the back of higher commodity prices, have peaked out in both regions. On the supply side, reviews and the resultant reduction of loans to low-return borrowers at major banks have put downward pressure on loan supply. Major banks have become more cautious about supplying loans to the Chinese economy and its peripheral economies, where adjustment pressure remains in the real estate market.

Chart III-1-13: Share of foreign loans in total loans



Note: On a non-consolidated basis. Latest data as of end-July 2023.
Source: BOJ.

Chart III-1-14: Foreign loans outstanding of the three major banks by region

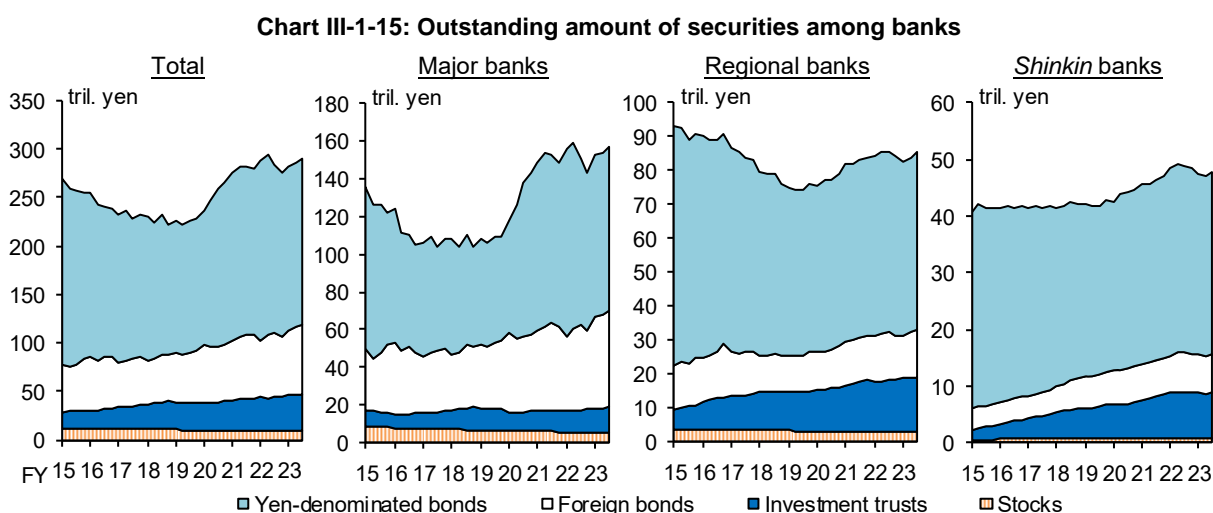


Note: Latest data as of end-July 2023.
Source: BOJ.

Loans to North America have continued to increase. This has been driven mainly by loans to investment funds, on which major banks have been focusing. However, the growth pace has slowed. Reasons include that both demand for working capital due to higher inflation and the shift from funding from capital markets to borrowing that reflects the rise in market interest rates have peaked out. In addition, the recent rise in loan interest rates has subdued loan demand.

2. Securities investment

Banks have continued to make domestic securities investments in a risk-conservative manner (Chart III-1-15).¹⁰ As for foreign securities investment, banks have adjusted their positions in view of the continued monetary tightening.



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 2023.

Source: BOJ.

Major banks have held back from accumulating holdings of yen-denominated bonds, including JGBs, municipal bonds, and corporate bonds due to the rise in interest rates and the decline in demand for collateral. They have taken a cautious stance toward investing in foreign bonds on the whole with foreign yield curves remaining inverted. Amid concerns over the risk of higher interest rates at home and abroad, major banks have continued with interest rate hedging by purchasing inverse mutual funds, for which net asset values increase when interest rates rise. Some banks have adopted flexible trading strategies 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.

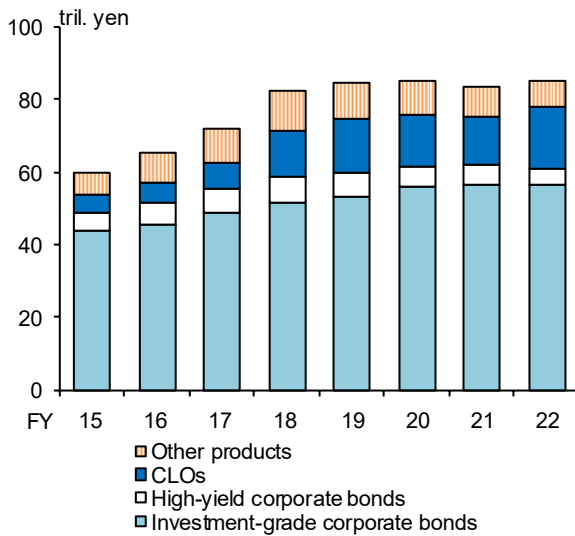
Regional and *shinkin* banks have also adopted a risk-conservative investment stance, reflecting the rise in interest rates at home and abroad. Amid concerns over the risk of higher interest rates, holdings of yen-denominated bonds have declined at both regional and *shinkin* banks. As for foreign bonds, regional banks in particular have continued to address the risk of negative interest margins and valuation losses (see Section B of Chapter IV for regional banks' hedging against interest rate risk). In order to reduce the risk of negative interest margins, some banks have replaced sovereign bonds with mortgage-backed securities (MBSs), which offer relatively high

¹⁰ The increase in the amount outstanding of foreign currency-denominated securities investment (calculated in yen terms) is attributable to the yen's depreciation.

yields, and floating-rate notes. Other banks have purchased inverse mutual funds to curtail the risk of valuation losses.

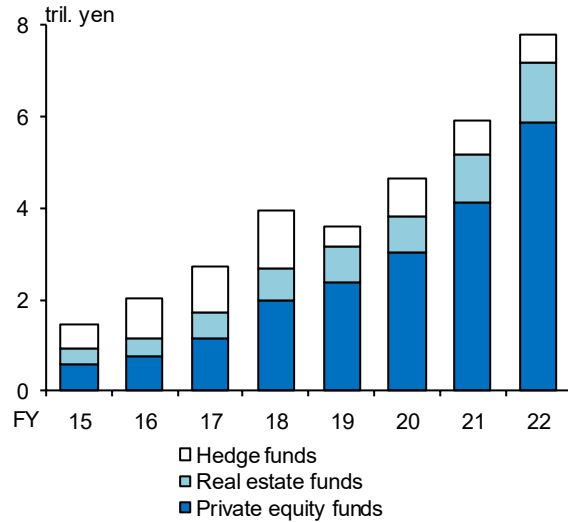
Banks have also been cautious about taking risks in foreign credit products. The outstanding amount of investment in foreign credit products by Japanese banks, including Japan Post Bank and a central organization of financial cooperatives, is unchanged (Chart III-1-16). Banks have reduced their positions in high-yield bonds to reduce market credit risk. Meanwhile, they 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-1-17).

Chart III-1-16: 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-1-17: 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

Assets under management held by non-bank financial intermediaries (NBFIs) in Japan have remained on an uptrend (Chart III-2-1).¹¹ Although their market presence has been limited compared to overseas, the increase in assets under management and the resultant expansion in market funding have contributed to an increase in the interconnectedness between NBFIs and banks in Japan.¹² Recent developments also show some differences by business within the non-bank financial sector. The investment positions of insurance companies and pension funds, which account for the largest share of financial assets held by NBFIs, have leveled off, due mainly to a reduction in foreign bondholdings. On the other hand, there has been an increase in financial dealers and brokers' positions in short-term repo transactions on both the asset and liability sides,

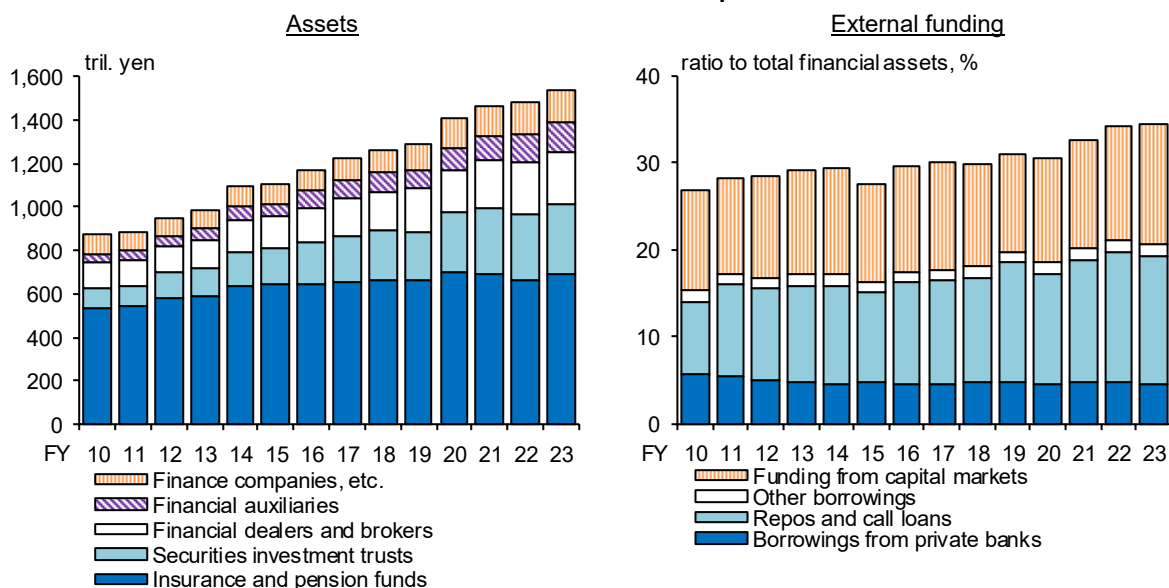
¹¹ In line with the definition of the Financial Stability Board (FSB), NBFIs here include all financial institutions (banking and non-banking sectors) that are not depository financial institutions, central banks, or public financial institutions.

¹² On a global basis, the share of financial assets held by NBFIs has risen to around 50 percent. On the other hand, in Japan, depository financial institutions are still dominant in financial intermediation and the share of NBFIs has remained at about 30 percent.

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

which broker arbitrage transactions with current account deposits at the Bank as well as transactions for JGB collateral.

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

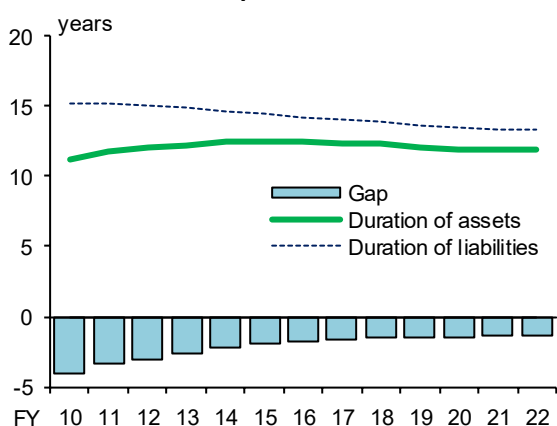


Note: "Financial auxiliaries" includes financial holding companies, stock exchanges, and financial instruments exchanges.
 "Finance companies, etc." includes finance companies, securities finance companies, and the Resolution and Collection Corporation. Latest data as of end-June 2023.
 Source: BOJ.

Insurance companies and pension funds

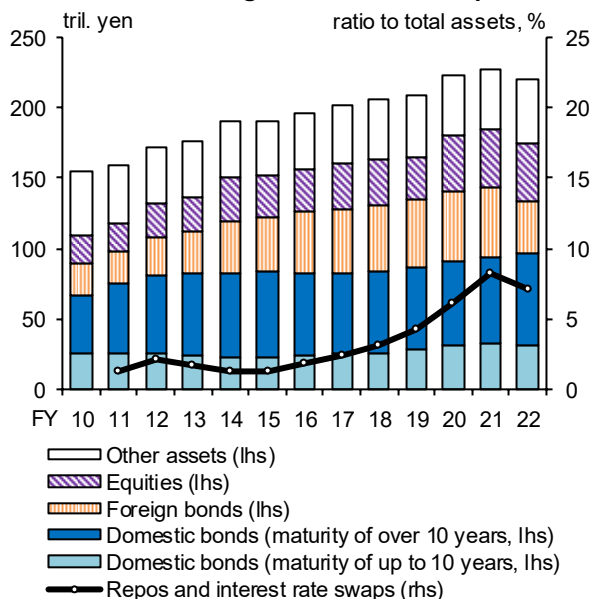
Life insurance companies have worked on reducing the duration gap between assets and liabilities in view of the introduction of economic value-based solvency margin ratio (ESR) regulations in 2025 (Chart III-2-2). In the past few years, they have invested in super-long-term bonds using

Chart III-2-2: Duration gap of life insurance companies



Note: Covers four major life insurance companies.
 Estimated based on general accounts.
 Source: Japan Institute of Life Insurance; Ministry of Internal Affairs and Communications; National Institute of Population and Social Security Research; Published accounts of each company; BOJ.

Chart III-2-3: Investment assets outstanding among life insurance companies

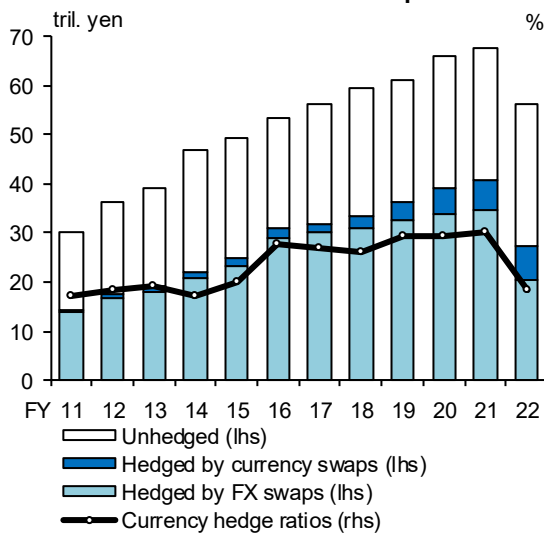


Note: 1. Covers nine major life insurance companies.
 Based on general accounts.
 2. Interest rate swaps indicate net positions calculated based on notional amounts.
 Source: Published accounts of each company.

premium income and such bonds using repo funding and interest rate swaps (Chart III-2-3). Meanwhile, life insurance companies' interest margins (investment returns minus assumed interest rates) have continued to increase moderately and their average ESR has been above 200 percent.¹³ In addition, they have a certain level of liquidity reserves.

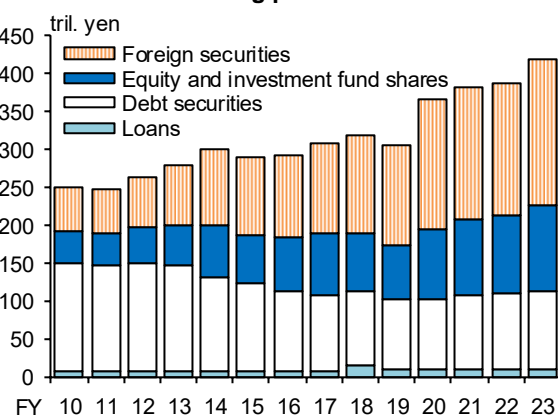
Recently, life insurance companies have reduced their holdings of currency-hedged foreign bonds due to the rise in foreign currency funding costs, including hedging costs. Accordingly, the currency hedge ratios of foreign bond positions have also declined substantially (Chart III-2-4). Reflecting the rise in on-hand liquidity due to sales of foreign bonds, repo funding has also decreased. If foreign yield curves remain inverted for longer, downward pressure on foreign bond positions could intensify further (see Section C of Chapter II).

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 each company.

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



Note: Covers pension funds and public pensions. Latest data as of end-June 2023. 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 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.¹⁴ Like the aforementioned life insurance companies, some of the pension funds have been selling currency-hedged foreign bonds (Chart III-2-5).¹⁵

¹³ Interest margins have widened, due mainly to the decline in assumed interest rates. According to a field test conducted by the Financial Services Agency, the average ESR for the 42 life insurance companies is significantly above the minimum standard of 100 percent.

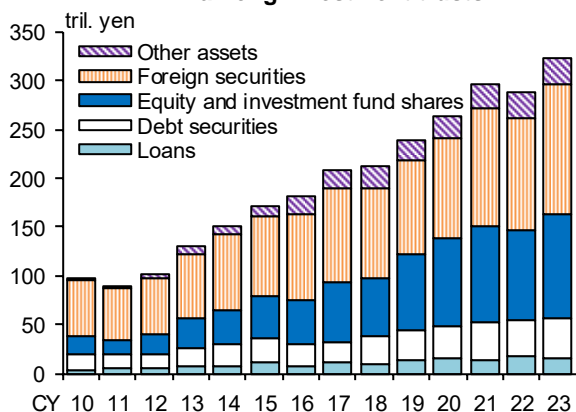
¹⁴ Japan's pension funds primarily follow simple investment strategies consistent with the policy asset mix or the basic portfolio allocation instead of strategies that make use of leverage, such as liability-driven investment strategies. For details, see Ito, Y., Kasai, Y., Todoroki, R., Toyoda, A., 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.

¹⁵ The increase in the amount outstanding of foreign securities (calculated in yen terms) is attributable to the yen's depreciation and higher stock prices in the United States and Europe.

Investment funds

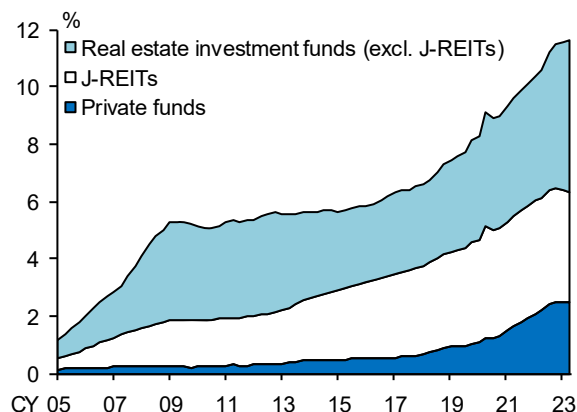
Investment funds' assets under management, especially those of securities investment trusts, have continued to increase on the back of steady inflows of funds (Chart III-2-6). The assets under management of leveraged private funds and real estate investment funds have increased (Chart III-2-7). With the rise in bank lending to these funds, the banking sector is more likely to be affected by NBFIs. Against this background, the possibility of a buildup in leverage not only within but also outside the banking system needs to be closely monitored.

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



Note: Latest data as of end-June 2023.
 Source: BOJ.

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

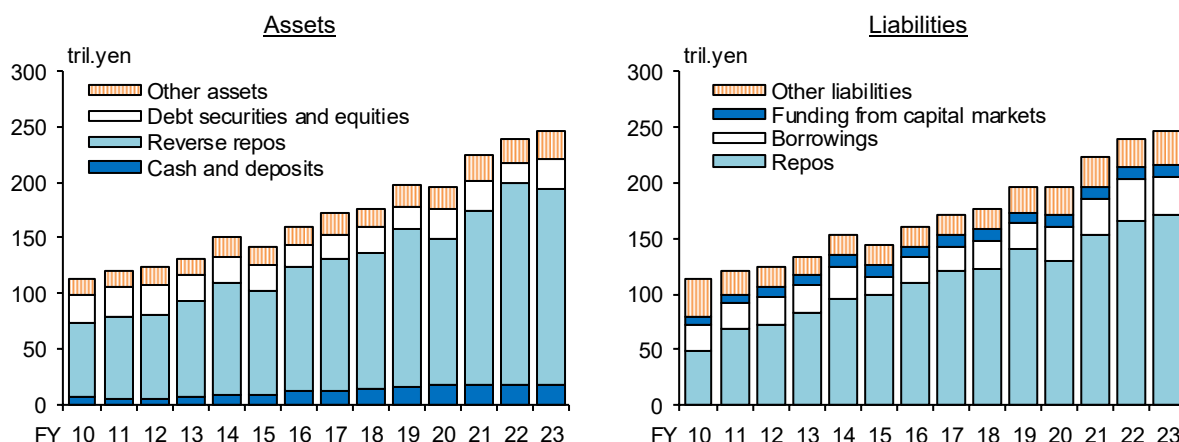


Note: 4-quarter backward moving averages. Latest data as of the April-June quarter of 2023.
 Source: Cabinet Office; Preqin; Sumitomo Mitsui Trust Research Institute; The Investment Trusts Association, Japan.

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).¹⁶ This reflects an increase in brokerage of arbitrage transactions by Japanese securities companies and *tanshi* companies (money market brokers) between short-term money market transactions and current

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



Note: "Equities" includes investment fund shares. Latest data as of end-June 2023.
 Source: BOJ.

¹⁶ 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.

account deposits at the Bank. It also reflects an increase in repo transactions by foreign securities companies' branches in Japan to broker JGB transactions to meet their headquarters' demand for JGBs as collateral. It should be noted that in most of these transactions by financial dealers and brokers, there is no duration mismatch between their assets and liabilities. However, when brokering transactions between participants and non-participants of central counterparties (CCPs), financial dealers and brokers could bear a liquidity burden equivalent to margin requirements for CCP participants until non-participants of CCP post margins. They may also face ad hoc margin calls in case of large price fluctuations in intraday market transactions.

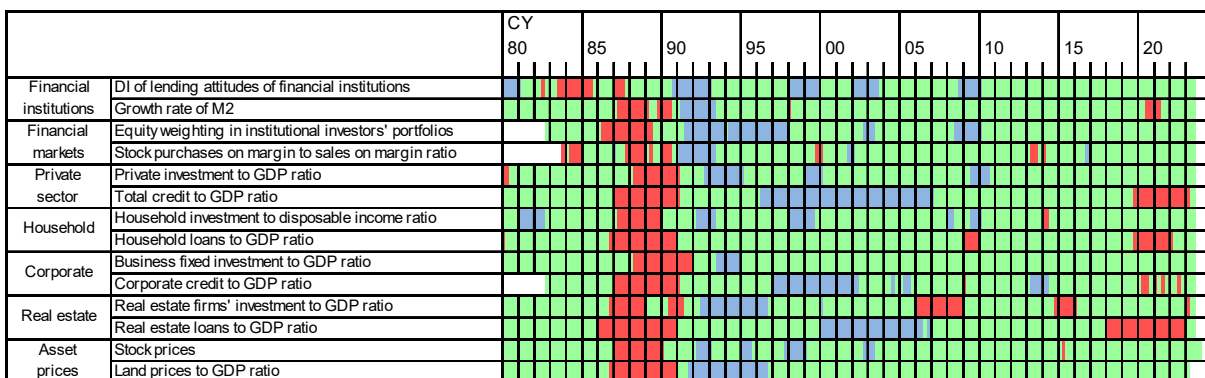
C. Financial cycle

As confirmed in the preceding sections, financial intermediation has continued its smooth functioning 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 for reference, indicating financial conditions in three different colors. The latest heat map shows that all 14 FAIXs are "green," which signals neither an overheating nor a contraction (Chart III-3-1).¹⁷ Looking at changes from the previous issue of the *Report*, the *total credit to GDP ratio* and the *real estate loans to GDP ratio* have turned from "red," which signals an overheating, to "green."¹⁸ The *real estate firms' investment to GDP ratio* temporarily turned "red."

Chart III-3-1: Heat map



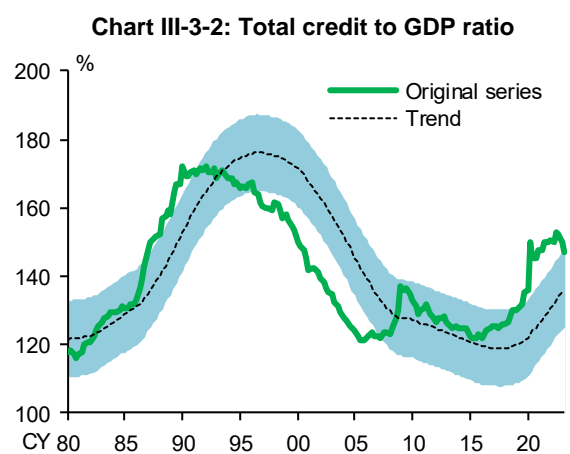
Note: The latest data for stock prices are as of the July-September quarter of 2023. The latest data for the land prices are as of the January-March quarter of 2023. Those for the other indexes are as of the April-June quarter of 2023.

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

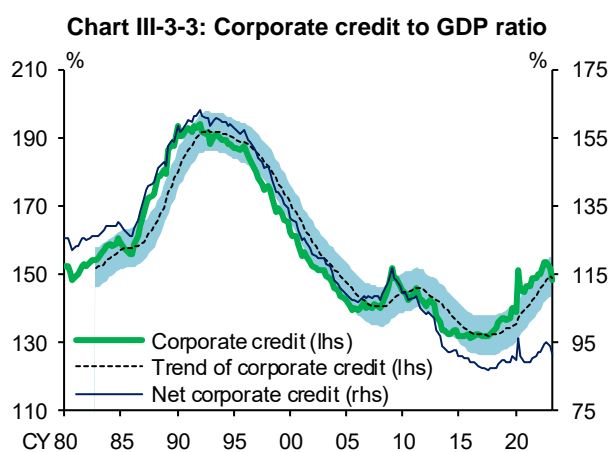
¹⁷ The heat map in Chart III-3-1 represents a mechanical assessment of whether financial activity is overheating or contracting. Specifically, the colors represent the following: (1) red indicates that an index is above its upper threshold; (2) blue indicates that an index is below its lower threshold; (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.

¹⁸ However, although in the "green" zone, the *total credit to GDP ratio* and the *real estate loans to GDP ratio* have been close to "red" in the heat map.

The *total credit to GDP ratio* and the *corporate credit to GDP ratio*, which previously had remained at high levels relative to their trends, show that the rebalancing of private debt and economic activity has continued as the economy has recovered (Charts III-3-2 and III-3-3). The *corporate credit to GDP ratio* has declined to a level close to the trend even though gross corporate credit has continued to increase. Although the two FAIXs remain at relatively high levels, this is due to cautious cash management, especially by small and medium-sized enterprises (SMEs), aimed at securing ample cash reserves. As suggested by the fact that net corporate credit (gross corporate credit minus firms' cash and deposits) has hardly expanded, a large increase in gross corporate credit since the start of the pandemic reflects larger cash reserve holdings by SMEs (see Section A of Chapter IV). Given these observations, there is no overheating of current financial activities.



Note: 1. "Trend" is calculated using the one-sided HP filter. The shaded area indicates the root mean square of the deviation from the trend.
2. Latest data as of the April-June quarter of 2023.
Source: Cabinet Office; BOJ.



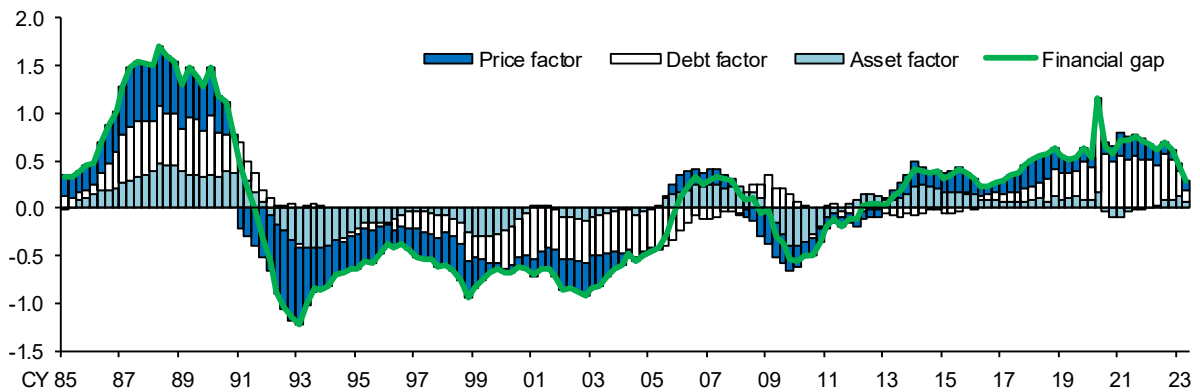
Note: 1. "Trend of corporate credit" is calculated using 3-year backward moving averages. The shaded area indicates the root mean square of the deviation from the trend.
2. "Net corporate credit" is the ratio to GDP of gross corporate credit excluding firms' cash and deposits.
3. Latest data as of the April-June quarter of 2023.
Source: Cabinet Office; BOJ.

Next, the financial gap -- a summary measure of the 14 FAIXs -- is examined to quantify changes in the financial cycle. It is calculated as the weighted average of the deviations of the 14 FAIXs from their trends (Chart III-3-4).¹⁹ The positive gap has narrowed recently because the contribution of the "debt factor," which had been one reason for the positive financial gap, has become smaller due to the rebalancing of private debt and economic activity. Although the positive contribution of real investment (the "asset factor") is gradually becoming larger, with the *real estate firms' investment to GDP ratio* temporarily turning "red," active real investment due to leverage and asset price increases (the "price factor") have been limited compared to the previous episode when financial imbalances built up in the late 1980s. Thus, no major financial imbalances can be observed in current financial activities.

However, in the medium to longer term, borrowing terms have become longer with the increase in private debt (Chart III-3-5). Seizing an opportunity from the decline in long-term interest rates, firms have secured stable funding at long-term fixed interest rates and contained refinancing risk. Households have reduced their monthly repayment burden for large-lot housing loans through long-term floating-rate loans at low interest rates. As a result, borrowing terms for both corporate and household loans have been at the peak range since the 2000s.

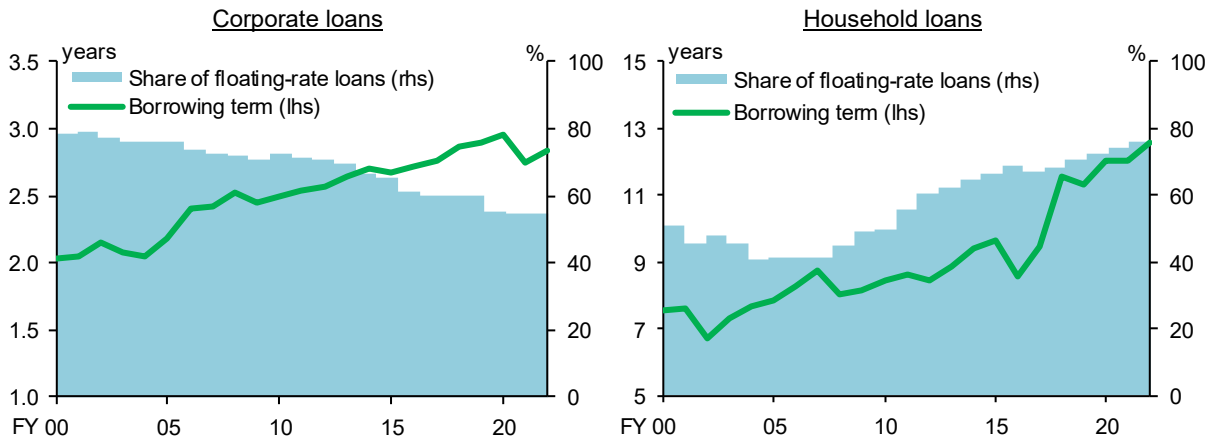
¹⁹ In Chart III-3-4, larger weights are assigned to indexes that have a higher correlation with other indexes in calculating the weighted average of individual FAIXs. The weights vary based on changes in the degree of correlation over time.

Chart III-3-4: 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 2023 (the land prices to GDP ratio is imputed by the previous period's value). Source: BOJ.

Chart III-3-5: Borrowing term



Note: "Borrowing term" shows estimated values. The data for "Share of floating-rate loans" from fiscal 2018 are actual values of major and regional banks; those up to fiscal 2017 are estimated values. Latest data as of fiscal 2022. Source: Ministry of Finance; Ministry of Land, Infrastructure, Transport and Tourism; Japan Housing Finance Agency; BOJ.

In addition, the current phase of a positive financial gap, which has continued since the early 2010s, is the longest on record in the post-bubble period. The *total credit to GDP ratio*, which has turned "green," has remained above the trend. If the rebalancing of private debt and economic activity takes time going forward, major financial imbalances could build up (Chart III-3-2).²⁰ Looking at "GDP-at-risk" (GaR), which shows risks to GDP growth, the probability distribution of future GDP growth rates over the next three years remains skewed to the left, toward an economic downturn (Chart III-3-6).²¹ This pattern suggests that increased private debt could result in balance sheet adjustment pressures and increase the risk of an economic downturn.

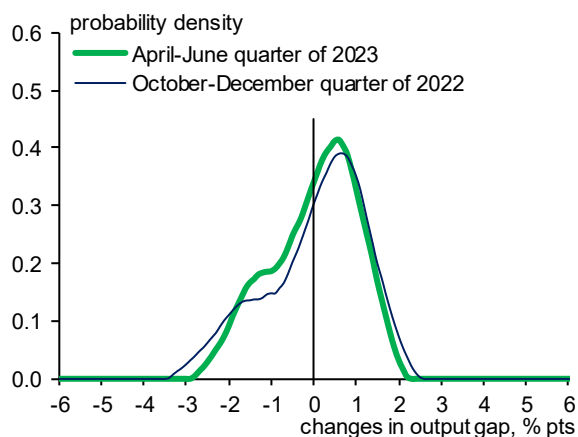
²⁰ Cross-country evidence of banking crises since 1980 shows that the probability of a subsequent crisis tends to be greater the longer the *total credit to GDP ratio* signals "red" for a protracted period or when that ratio and certain other financial activity indexes simultaneously signal "red." For details, see Box 1 in the April 2021 issue of the *Report*.

²¹ 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:

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

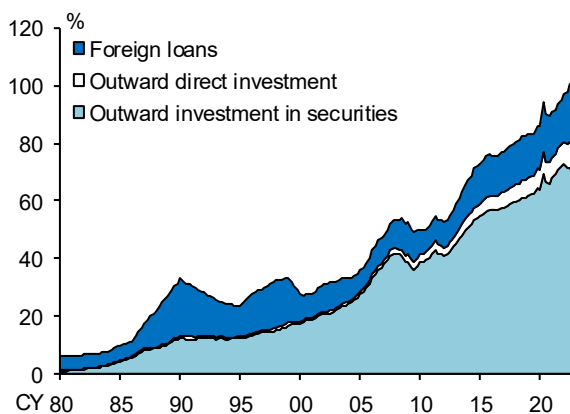
For details on the GaR approach, including the underlying rationale, estimation method, and caveats regarding its use, see Section B of Chapter IV and Box 1 of the October 2018 issue of the *Report*.

Chart III-3-6: 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.

Chart III-3-7: External credit to GDP ratio



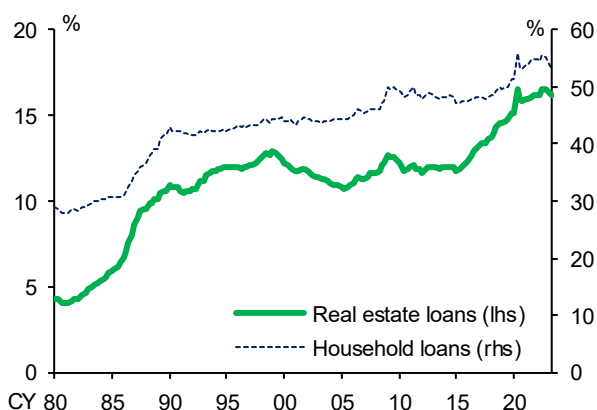
Note: Covers depository financial institutions and NBFIs. 4-quarter backward moving averages. Latest data as of the April-June quarter of 2023. Source: Cabinet Office; BOJ.

Meanwhile, foreign credit has increased as a trend (Chart III-3-7). Foreign lending by major banks and foreign bond investment by banks and institutional investors have led to an increasing trend in foreign currency interest rate risk, although their positions have been reduced recently. Due to the increase in foreign credit, Japan's financial system has become more susceptible to foreign economic and financial conditions through not only the real economic channel but also the financial channel. The global tightening of financial conditions has affected Japanese financial institutions' business conditions through the repricing of foreign assets and the rise in foreign currency funding costs. Moreover, since the presence of Japanese financial institutions, albeit limited at the moment, reaches a certain level in foreign bond markets, their adjustment of positions could have an impact on the market.

2. Financial cycle and real estate market

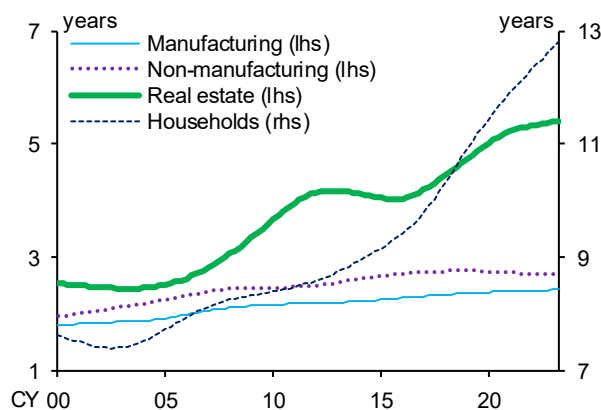
Real estate-related loans -- i.e., loans to real estate businesses and housing loans -- have continued to increase even amid the rebalancing of private debt and economic activity. The recent rise in real estate-related loans has been accompanied by longer loan periods (Charts III-3-8 and III-3-9). Against this background, it remains important to monitor whether there has been an

Chart III-3-8: Real estate-related loans to GDP ratio



Note: Latest data as of the April-June quarter of 2023. Source: Cabinet Office; BOJ.

Chart III-3-9: Borrowing term by industry

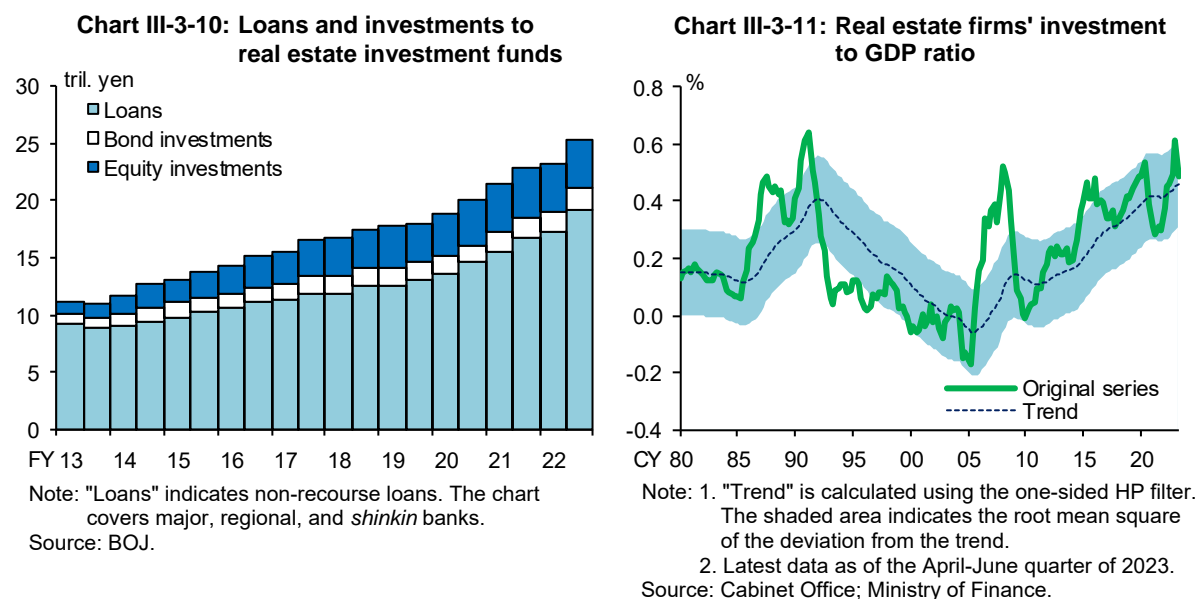


Note: Shows the trend calculated using the HP filter. "Non-manufacturing" excludes real estate businesses. Latest data as of the April-June quarter of 2023. Source: Japan Housing Finance Agency; Ministry of Finance; BOJ.

increase in loans to borrowers with a relatively low resilience to a decline in income and higher interest rates. The following provides an overview of the increase in lending in the current financial cycle, touching on loans to real estate businesses and housing loans.

Increase in loans to real estate businesses

In the real estate market, changes can be seen in terms of both liabilities and assets of real estate businesses, as well as real estate prices. On the liability side, the *real estate loans to GDP ratio* has remained high at its historical peak range (Chart III-3-8). Especially in the real estate transaction market, there continues to be demand for funds, mainly by foreign investors against the backdrop of the low interest rate environment. In response to this demand, Japanese banks' lending to and investment in real estate investment funds, centered on major banks' non-recourse loans, have been on an uptrend (Chart III-3-10).

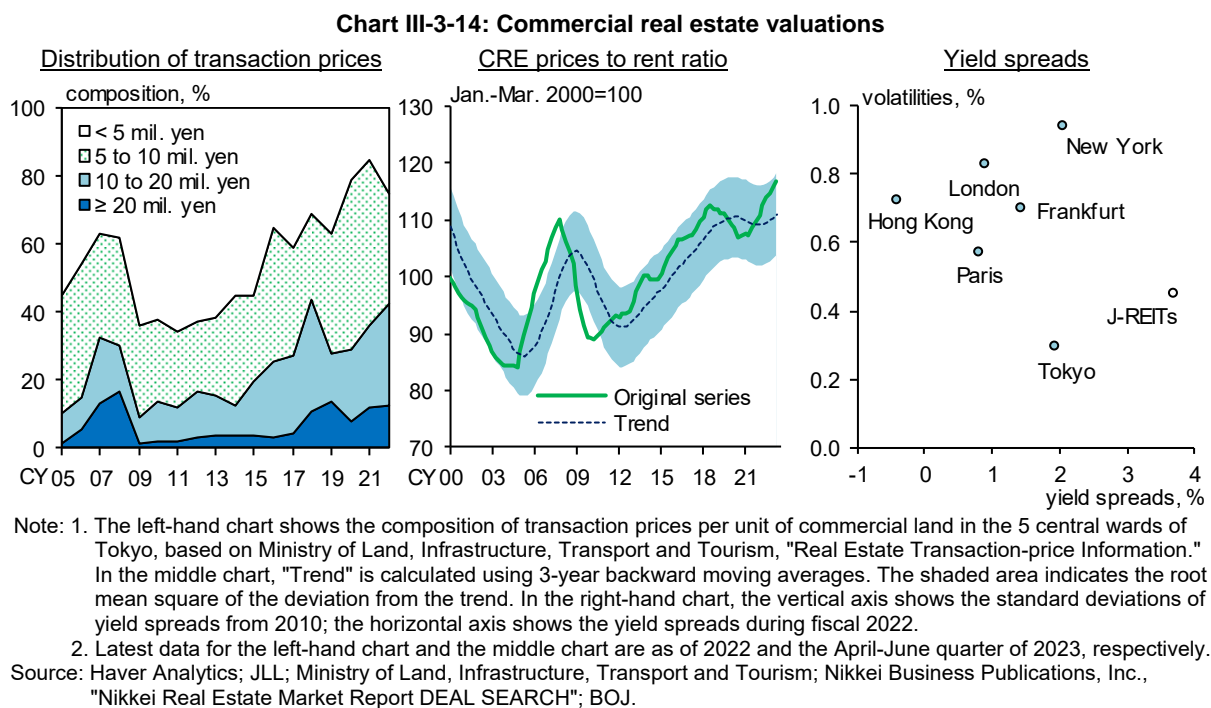
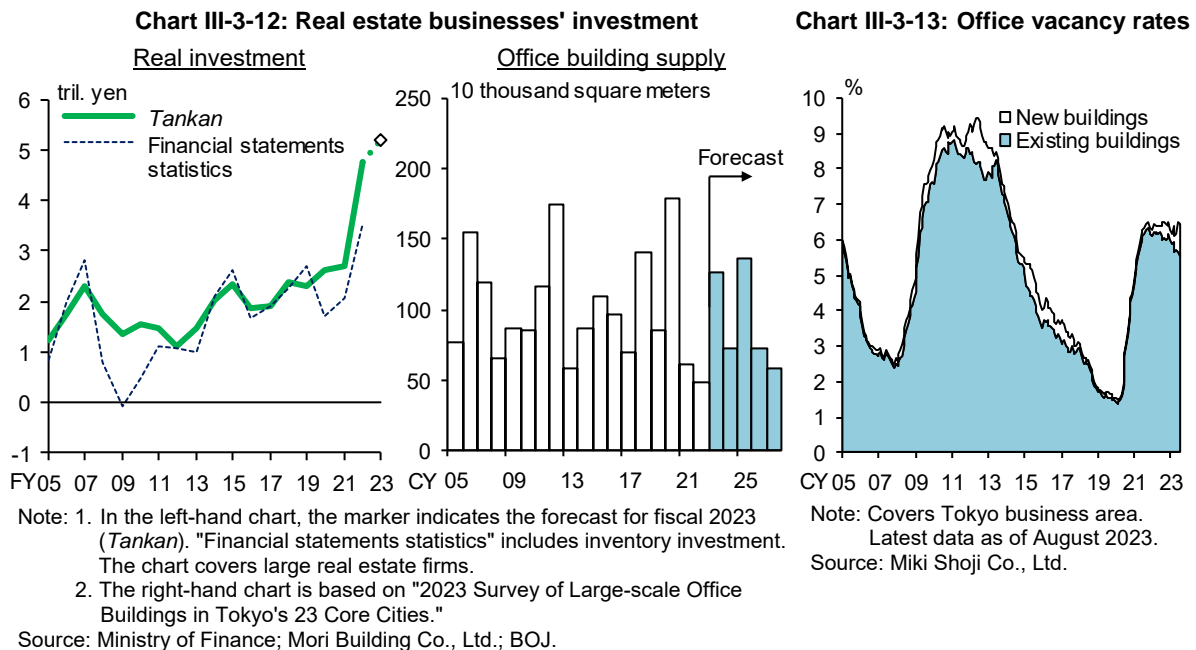


On the asset side, the *real estate firms' investment to GDP ratio* temporarily turned "red" (Chart III-3-11). The ratio has exceeded that of the mini-bubble period in the late 2000s and is at a level second only to the record high in the early 1990s. The increase in real estate firms' investment has been accelerated by urban redevelopment projects by major real estate developers, including the construction of offices and commercial facilities (left panel of Chart III-3-12). Major developers' investment in fiscal 2023 is expected to be at a higher level than the previous year. Looking ahead, a large supply of office buildings is planned, mainly in Tokyo (right panel of Chart III-3-12).

Against this background, vacancy rates for office buildings have remained at a relatively high level (Chart III-3-13). Even in new office buildings, it is taking some time to fill vacancies. In terms of prices, valuations of some properties seem relatively high. Since land prices have shown only small fluctuations across Japan, there is currently no overheating in the *land prices to GDP ratio* (Chart III-3-1). However, in some limited commercial areas in central Tokyo, transactions in the higher price range have been increasing (left panel of Chart III-3-14).²² Moreover, the *commercial real estate prices to rent ratio* in Japan as a whole has been above the level seen in the mini-bubble

²² According to the Land Value LOOK Report released by the Ministry of Land, Infrastructure, Transport and Tourism, land prices rose compared to three months earlier in 93 percent of the major cities in Japan, and 1 percent of cities saw an increase of more than 6 percent (as of July 2023).

period (middle panel of Chart III-3-14).²³ The yield spreads of some projects are below the J-REITs' target level of around 4 percent.

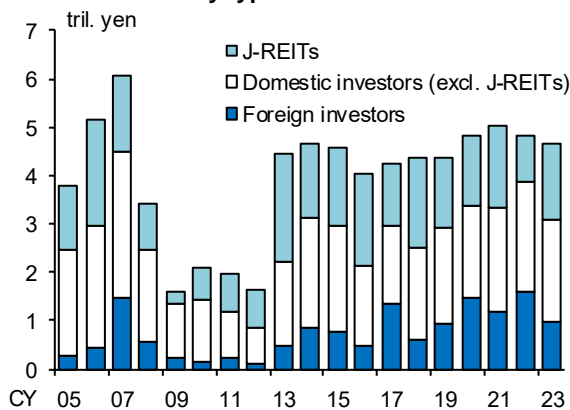


While domestic investors such as J-REITs have become more selective in their investment stance against the backdrop of changing valuations, there has been no notable change in the investment stance of foreign investors (Chart III-3-15). Foreign institutional investors -- insurance companies, pension funds, and sovereign wealth funds, which are expected to hold real estate for a long time -- have generally remained active in their investment stance. One of the reasons for this stance

²³ The FAIXs in Chart III-3-1, such as the *land prices to GDP ratio*, are designed so that they signal "red" for the bubble period in the late 1980s. In contrast, for the commercial real estate (CRE) prices to rent ratio in Chart III-3-14, the trend and threshold are set so that the ratio signals "red" for the so-called mini-bubble period in 2007.

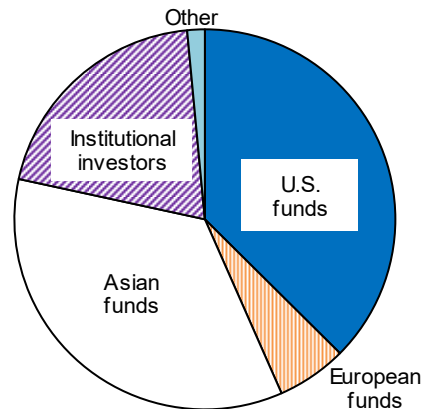
is that investment profitability in Japan's real estate market has been stable and therefore is relatively attractive to foreign institutional investors (right panel of Chart III-3-14).²⁴ To some degree, their investment behavior has reduced the risk of a correction in Japan's real estate market. On the other hand, foreign investment funds that diversify their investment globally, such as global REIT funds, have a greater presence in Japan's real estate market than foreign institutional investors (Chart III-3-16).²⁵ As the foreign real estate markets have been gradually experiencing correction, close attention should continue to be paid to the fact that Japan's real estate market has become more susceptible to developments in the global market, such as a global portfolio rebalancing and repatriation by foreign investment funds (see Box 1 on the contagion risk from foreign real estate markets).

Chart III-3-15: Real estate property acquisitions by type of investor



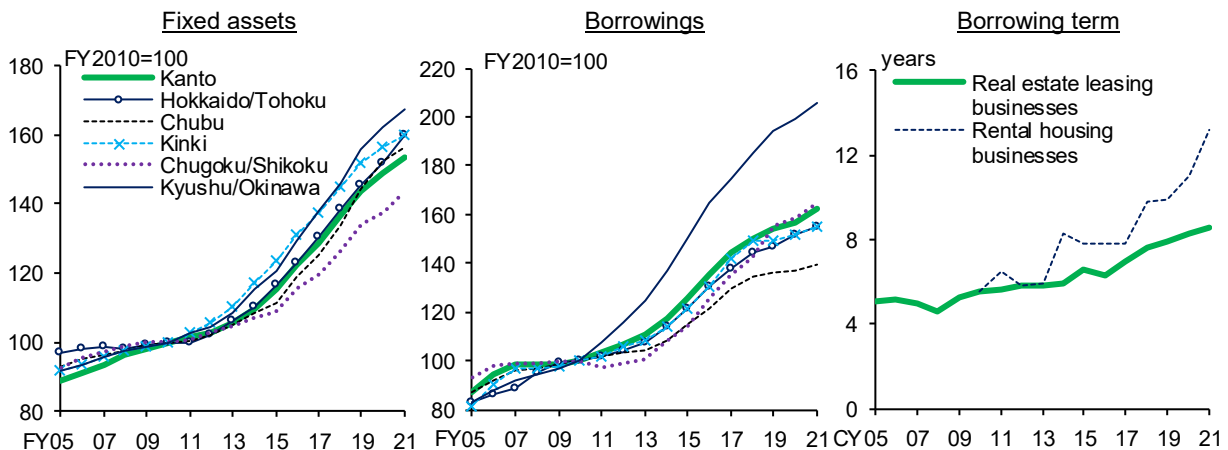
Note: The latest data are annualized values for the first half of 2023.
Source: Japan Real Estate Institute.

Chart III-3-16: Composition of foreign investors



Note: Shows the composition of real estate acquisition amount for the period from January 2020 to June 2023.
Source: Nikkei Business Publications, Inc., "Nikkei Real Estate Market Report DEAL SEARCH."

Chart III-3-17: Balance sheet of real estate leasing businesses



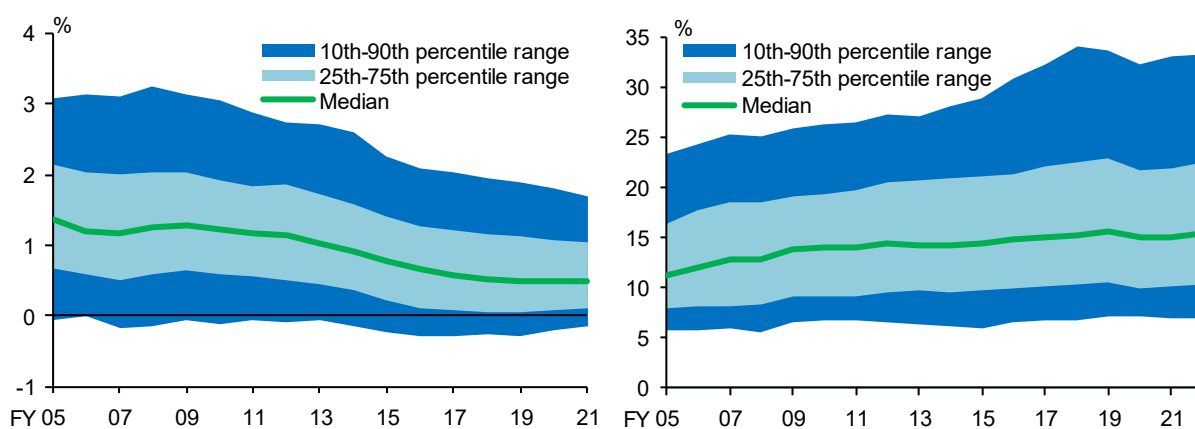
Note: 1. In the left-hand chart, the data are aggregated based on the location of head offices of small and medium-sized leasing businesses with capital of less than 100 million yen.
2. In the middle chart, the data are aggregated based on the location of head offices of regional and *shinkin* banks.
3. In the right-hand chart, the data are calculated as the borrowings divided by short-term (within 1 year) borrowings.
Source: CRD Association; BOJ.

²⁴ The depreciation trend of the yen is pointed out as one reason why foreign institutional investors have been bringing forward their real estate investment.

²⁵ Among the foreign investment funds active in Japan, 40 percent invest globally, 50 percent invest in the APAC region, and 10 percent invest in Japan only (aggregate value based on fundraising from January 2020 through June 2023).

In the real estate leasing market, the rise in investment in fixed assets by real estate leasing businesses and the corresponding increase in borrowings from regional and *shinkin* banks have continued (Chart III-3-17). In addition, the trend toward longer borrowing terms has continued to be observed. As pointed out in the previous *Report*, rental income has declined and the number of vacant houses has increased across Japan.²⁶ Under such circumstances, banks' profitability of lending to real estate leasing businesses has remained on a declining trend (Chart III-3-18). At some regional and *shinkin* banks, net interest income from such lending has become smaller than expenses, and at some the share of real estate loans exceeds 30 percent. It is necessary for banks to strengthen their initial screening and monitoring of borrowers, taking the dynamics in the number of households and resultant risk of rising dwelling vacancy rates into account. Moreover, banks need to further enhance the effectiveness of their credit management, such as tightening the control of limits on loans to the real estate industry if necessary.

Chart III-3-18: Profitability (lhs) and share (rhs) of loans to real estate businesses



Note: 1. The left-hand chart shows the distribution of banks' profitability. Profitability is calculated as: interest rates for loans – overhead ratios for the domestic business – Japanese yen funding costs.
2. The right-hand chart shows the distribution of the ratio of real estate loans to total loans across major, regional, and *shinkin* banks. Latest data as of fiscal 2022.
Source: Teikoku Databank; BOJ.

Increase in housing loans

The outstanding amount of housing loans, which account for the largest part of household debt, has continued to increase, and the loan-to-income (LTI) ratio -- the ratio of loans to borrowers' annual income at the time of loan origination -- has reached an all-time peak (Charts III-3-8 and III-3-19). Dual-income households have continued to take out larger housing loans than in the past using joint loans for couples. Looking at the debt servicing ratio (DSR) -- the ratio of annual repayments to annual income at the time of loan origination -- the share of housing loans with a DSR of 30 percent or above has continued to rise against the background of historically low loan interest rates (Chart III-1-12).²⁷ These larger housing loans have also led to longer borrowing terms.

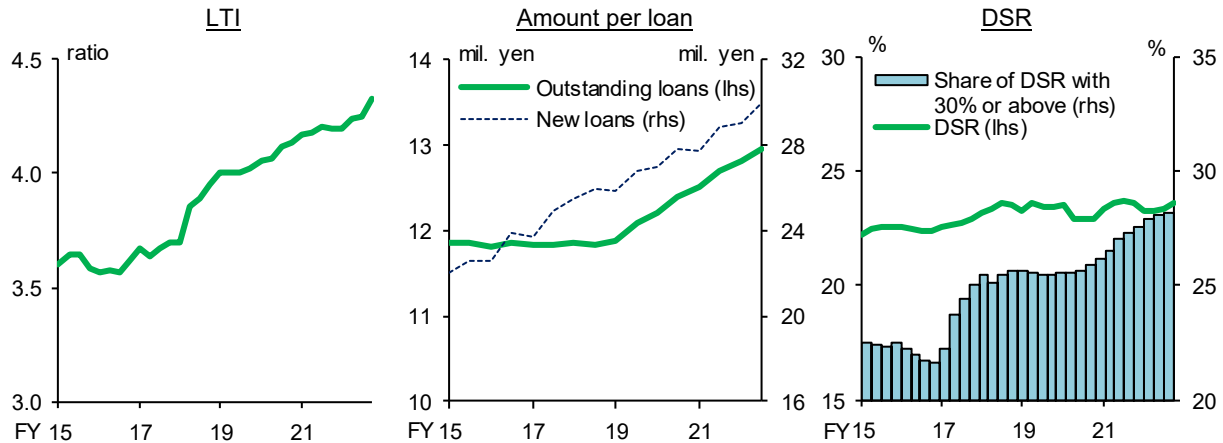
From the perspective of banks and guarantee companies, the increase in the outstanding amount of housing loans and prolonged borrowing terms could lead to an increase in credit risk. The higher the DSR and the greater the number of months since the loan origination, the more likely borrowers are to default on their housing loans (Chart III-3-20). Looking at a breakdown of housing loans, the outstanding amount of housing loans without guarantees has been increasing, particularly at

²⁶ For details, see Section C of Chapter III in the April 2023 issue of the *Report*.

²⁷ Of housing loans provided by major banks and regional banks, floating-rate housing loans have continued to dominate, with the share standing at 85 percent for new loans and 76 percent for outstanding loans as of the end of fiscal 2022 (right panel of Chart III-3-5).

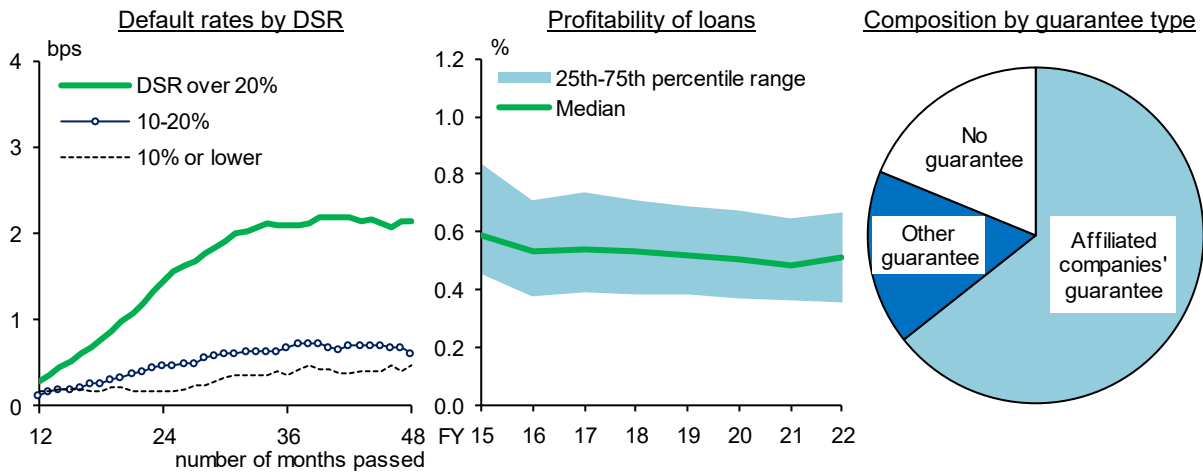
internet-only banks. Of guaranteed housing loans, 80 percent are guaranteed by affiliated housing loan guarantee companies within the same banking groups. For banks, risks are more diversified in housing loans than in corporate loans, and based on the track record, it seems unlikely that housing loans will give rise to a large amount of credit costs. However, the profitability of housing loans has been below 1 percent. Banks therefore need to carefully examine housing loan applications and households' income situation, taking into account the possibility that the amount of interest payments will increase and their debt repayment capacity will deteriorate during long borrowing terms.

Chart III-3-19: Characteristics of housing loans



Note: In principle, covers major, regional, and *shinkin* banks. The left-hand chart and the right-hand chart show 4-quarter backward moving averages. Latest data as of the January-March quarter of 2023.
Source: BOJ.

Chart III-3-20: Credit risk of housing loans



Note: 1. The left-hand chart shows the share of the number of prepayment-requested loans among mortgage-backed securities (launched since 2013) of Japan Housing Finance Agency. 12-month backward moving averages.
2. The middle chart is calculated as: interest rates on housing loans - funding costs - group credit insurance premiums (0.3%). Covers regional and *shinkin* banks.
3. The right-hand chart covers banks and *shinkin* banks. Data as of end-March 2023.
Source: Japan Housing Finance Agency; BOJ.

IV. Risks faced by financial institutions

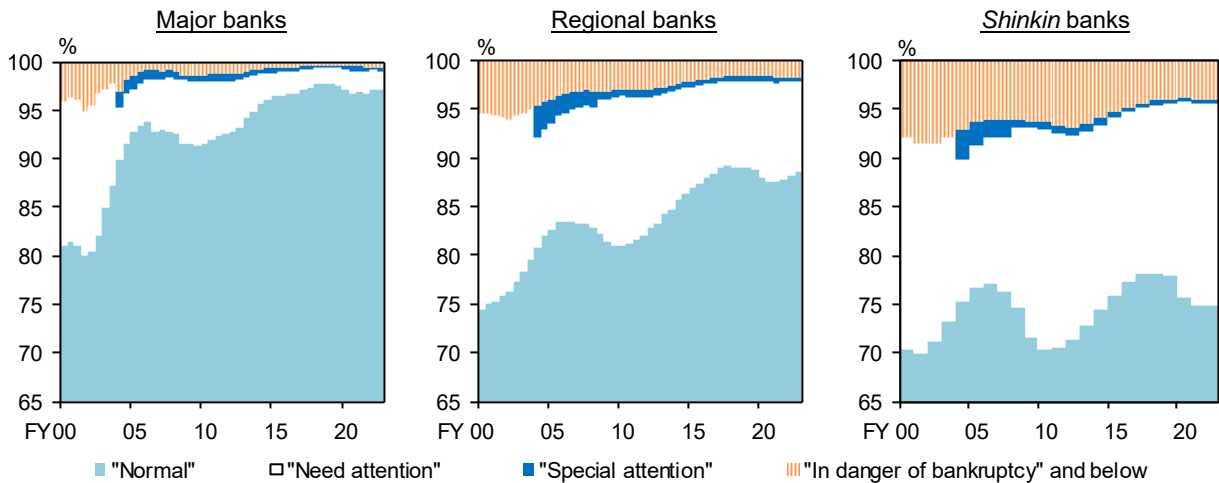
- The quality of banks' domestic and foreign loan portfolios has been maintained. In Japan, many firms have held ample cash reserves, which have kept firm defaults low. However, cash reserves for some firms have continued to decline, leading to an increase in bankruptcies. With regard to foreign loans, banks have been more selective in their lending stance, and their loss-absorbing capacity has continued to improve. However, the credit risk of loans to the Asia-Pacific region has been rising.
- The increase in banks' valuation losses on securities has been limited compared to the beginning of 2023. However, many banks have continued to register net valuation losses. The risk of negative interest margins on foreign bondholdings has materialized at some banks. Therefore, banks need to continue to manage the risk of negative interest margins and valuation losses appropriately while taking changes in risk profiles into account.
- Banks have loss-absorbing capacity that is commensurate with yen interest rate risk. However, interest rate risk on the asset side has increased as the duration of assets has become longer during the past decade. Banks need to manage interest rate risk while taking into account the mechanism of the direct impact of interest rate fluctuations on the banking sector, which is determined by (1) the shape of the yield curve, (2) banks' balance sheet structure (the duration gap between assets and liabilities), and (3) the interest rate pass-through to investment and funding products.
- 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

The credit risk posed to banks has remained low. Looking at loans by borrower classification, the shares of normal loans have stayed high (Chart IV-1-1). The shares of normal loans, which had declined somewhat at major and regional banks, have returned to pre-pandemic levels. At the same time, the shares of borrowers classified as "in danger of bankruptcy" and below have remained at historically low levels. There has been no marked change in estimates of unexpected losses since the previous issue of the *Report* (Chart IV-1-2).²⁸ 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.

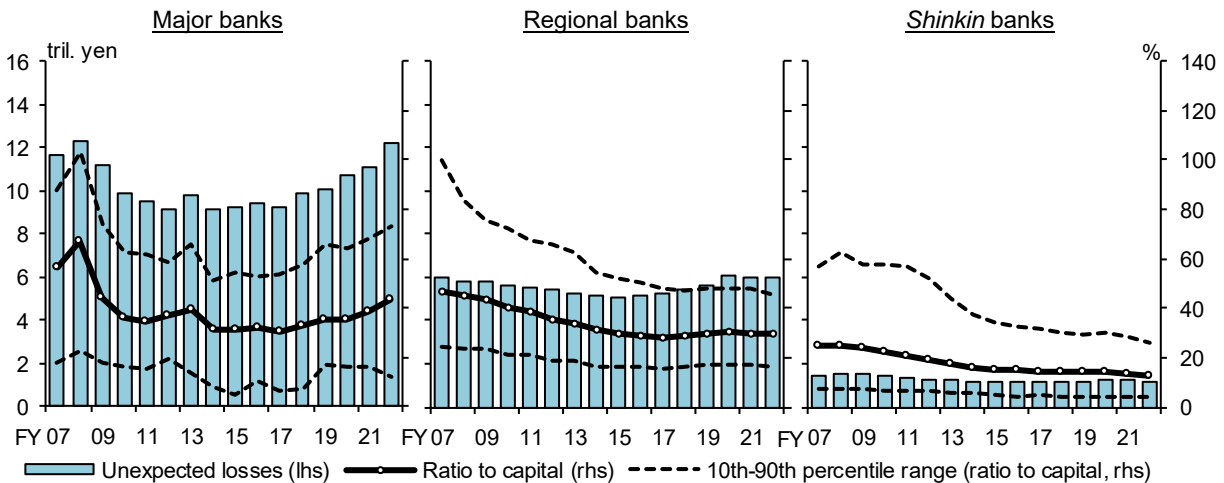
²⁸ Unexpected losses in Chart IV-1-2 are defined as the difference between the maximum amount of losses on loans that could occur with a 99 percent probability within a year and the amount of losses that occur on average in a year (expected losses). The calculation is based on the actual default rate 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."

Chart IV-1-1: Breakdown of domestic and foreign loans by borrower classification



Note: "Need attention" indicates "Need attention excluding special attention" from fiscal 2004. Latest data as of end-March 2023. Source: BOJ.

Chart IV-1-2: Unexpected losses of domestic and foreign loans



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 end-March 2023. Source: BOJ.

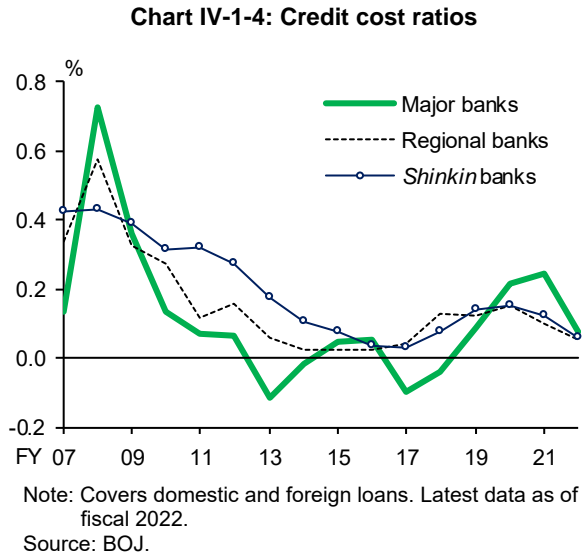
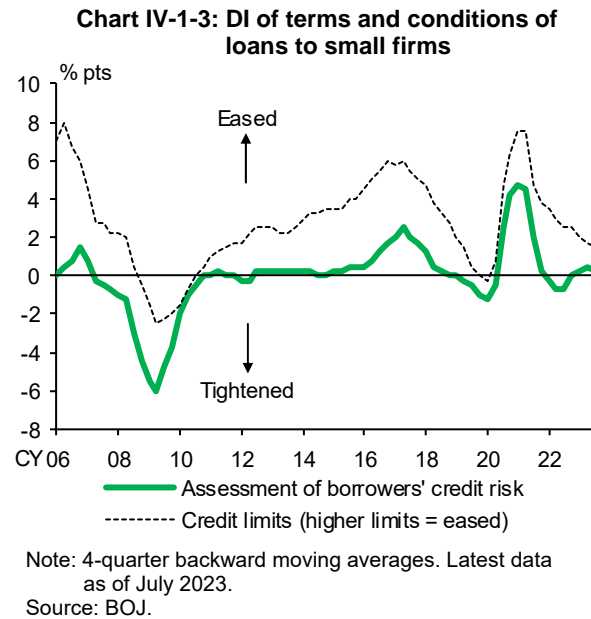
However, there have been various changes in the environment surrounding borrower firms. The cumulative rise in various input/funding costs and the slowdown of the global economy have led to a deterioration in the financial conditions of domestic and foreign firms. In Japan, many firms have begun to repay the principal of their effectively interest-free and unsecured loans (zero-zero loans), and since the beginning of fiscal 2023, the interest subsidies have been gradually coming to an end. Overseas, U.S. and European banks have tightened their lending stance against the backdrop of past policy rate hikes and bank failures since March 2023. This section examines the potential credit risk faced by banks, focusing on the impact of these changes on firms' financial conditions.

1. Domestic credit risk

Banks' domestic lending stance has remained active even with firms facing a variety of stresses (see Section A of Chapter III). Looking at banks' loan conditions, there has been no sustained tightening in the risk assessment of loans to small firms (Chart IV-1-3). Credit lines for small firms

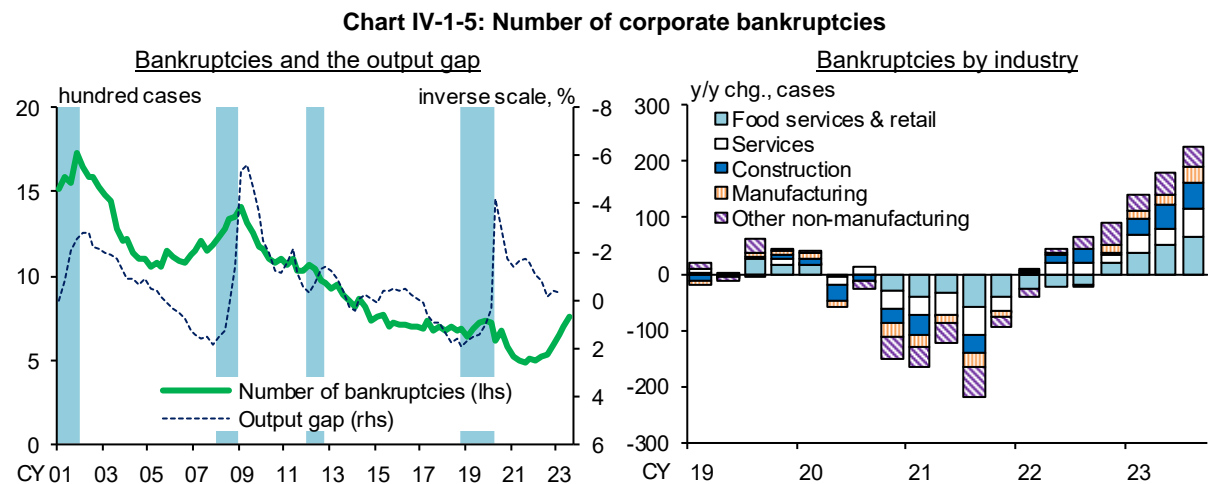
IV. Risks faced by financial institutions
A. Credit risk

remain elevated. Credit risk is managed appropriately and banks' credit cost ratios remain low (Chart IV-1-4).



Increase in bankruptcies amid an improving economy

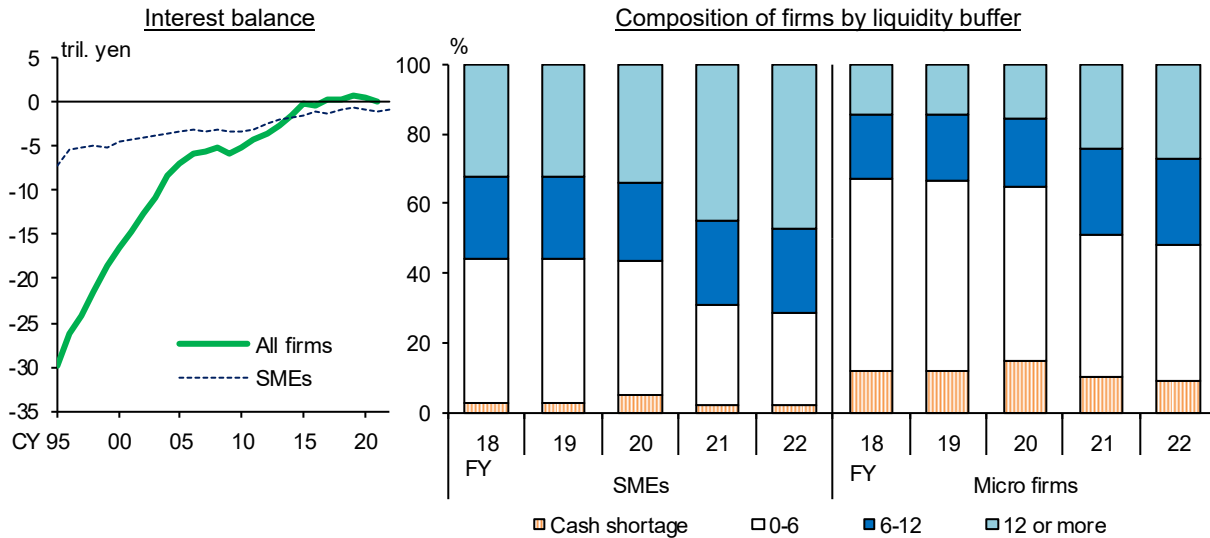
Despite these accommodative financial conditions accompanied by the recovery trend in economic activity, bankruptcies of firms have been on the rise since the end of last year (left panel of Chart IV-1-5). Most recently, the number of bankruptcies has been at around the same level as before the pandemic. By industry, there has been a rebound in the number of bankruptcies among SMEs, such as in the food services and retail industries, where bankruptcies had been subdued during the pandemic (right panel of Chart IV-1-5). This differs from the pattern of bankruptcies seen before. From the 2000s, bankruptcies tended to increase along with the deterioration of the output gap, whereas bankruptcies recently have increased with the improvement of the gap.



Note: 1. The shaded areas in the left-hand chart indicate recession phases. The data for "Number of bankruptcies" are quarterly averages. The latest data for "Number of bankruptcies" are as of July-August 2023 and the latest data for "Output gap" are as of the January-March quarter of 2023.
2. The data for the right-hand chart are quarterly averages. Latest data as of July-August 2023.
Source: Teikoku Databank; Tokyo Shoko Research; BOJ.

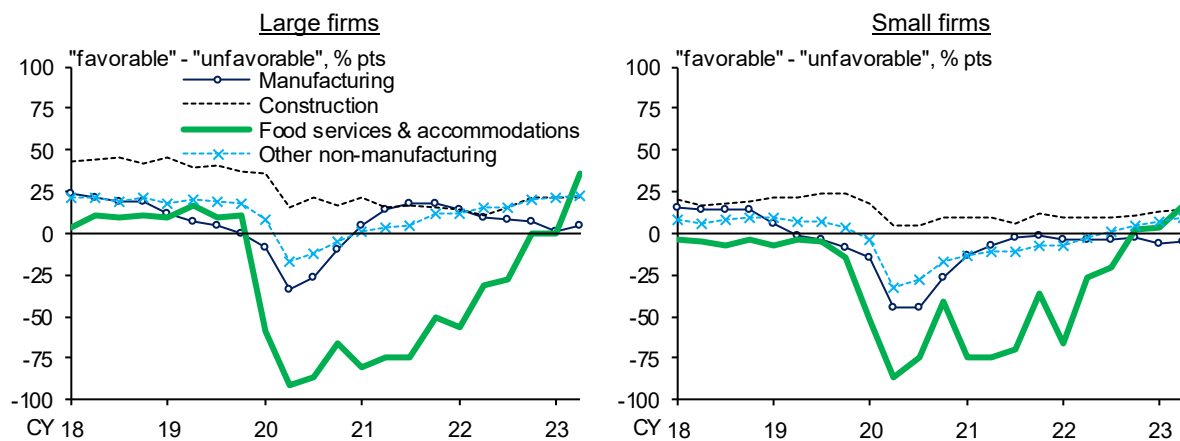
Firms' financial conditions on the whole have been improving. The interest balance of firms overall has been zero since the mid-2010s and the interest payment burden has remained low (left panel of Chart IV-1-6). SMEs' net interest payments are also at a historically low level. Further, the *Tankan* (Short-Term Economic Survey of Enterprises in Japan) shows that the DI of business conditions has started to improve for both large and small firms (Chart IV-1-7). Business conditions in the food services and accommodations industry, which had been severely hit by the pandemic, have turned from "unfavorable" to "favorable."

Chart IV-1-6: Firms' financial condition



Note: 1. Interest balance for "SMEs" in the left-hand chart includes dividend income. The latest data for "All firms" are as of 2021 and the latest data for "SMEs" are as of 2022.
 2. Liquidity buffer in the right-hand chart is calculated as the ratio of cash reserves (the sum of liquid assets at the beginning of each fiscal year and net operating cash flow during the year) to monthly average administrative expenses.
 Source: Cabinet Office; CRD Association; Ministry of Finance.

Chart IV-1-7: DI of business conditions



Note: Latest data as of June 2023.
 Source: BOJ.

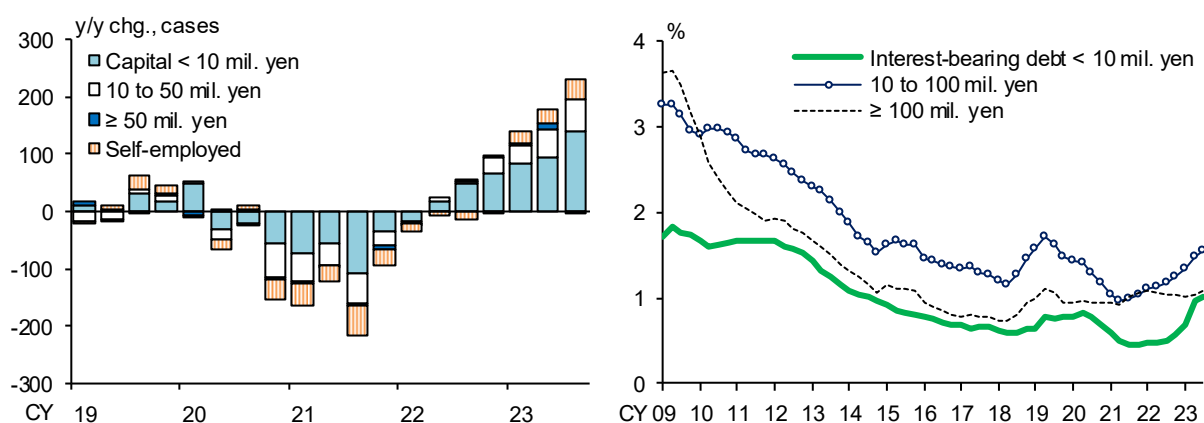
The increase in bankruptcies amid the situation of an improving economy suggests that firms' financial conditions are becoming increasingly polarized, even for firms of similar size and in the same industry. The distribution of firms in terms of their liquidity buffer (the ratio of cash reserves to administrative expenses) shows that the number of firms with relatively ample cash reserves (the sum of liquid assets at the beginning of each fiscal year and net operating cash flow during the year) -- for example, firms with cash reserves equal to half or more of their annual administrative expenses -- has increased substantially since the outbreak of the pandemic (right panel of Chart

IV-1-6).²⁹ Thus, most firms have a large amount of cash reserves, with the share reaching 70 percent among SMEs and 50 percent among micro firms (see Section C of Chapter III). On the other hand, 2 percent of SMEs and 9 percent of micro firms still suffer from a cash shortage, i.e., negative cash reserves, even with the improving economy. It is likely that some of these firms with cash shortages have gone bankrupt.

Link between increased bankruptcies and credit costs

Even though bankruptcies have been rising, banks' credit costs have remained limited (right panel of Chart IV-1-4). This is partly because small-sized firms account for the overwhelming majority of recent bankruptcies and defaults (Chart IV-1-8). Both in terms of their capital and interest-bearing debt, firms with less than 10 million yen account for a substantial share. Moreover, since the outbreak of the pandemic, banks have been building up precautionary loan-loss provisions, such as by making so-called group provisions, where certain borrowers are classified into a group and a higher provision ratio is set for that group. This has also helped to keep additional credit costs in check. It should be noted, however, that the credit risk of loans guaranteed by credit guarantee corporations has been transferred from banks to credit guarantee corporations.

Chart IV-1-8: Number of bankruptcies (lhs) and default rates (rhs)



Note: 1. The right-hand chart shows the share of borrowers that meet the following conditions for the first time: becoming delinquent for 3 months or longer, or being downgraded to "in danger of bankruptcy" or below.
2. The data are quarterly averages. The latest data for the left-hand chart are as of July-August 2023 and the latest data for the right-hand chart are as of July 2023.
Source: Teikoku Databank; The Risk Data Bank of Japan.

Bankruptcies and defaults going forward

The recent increase in bankruptcies is likely to be caused by "distressed" firms, for which business has been deteriorating since before the pandemic -- i.e., firms that are both insolvent and are making operating losses, but are classified as "normal" or "need attention."³⁰ Firm defaults are defined as being either (1) delinquent for three months or longer, (2) downgraded to a borrower

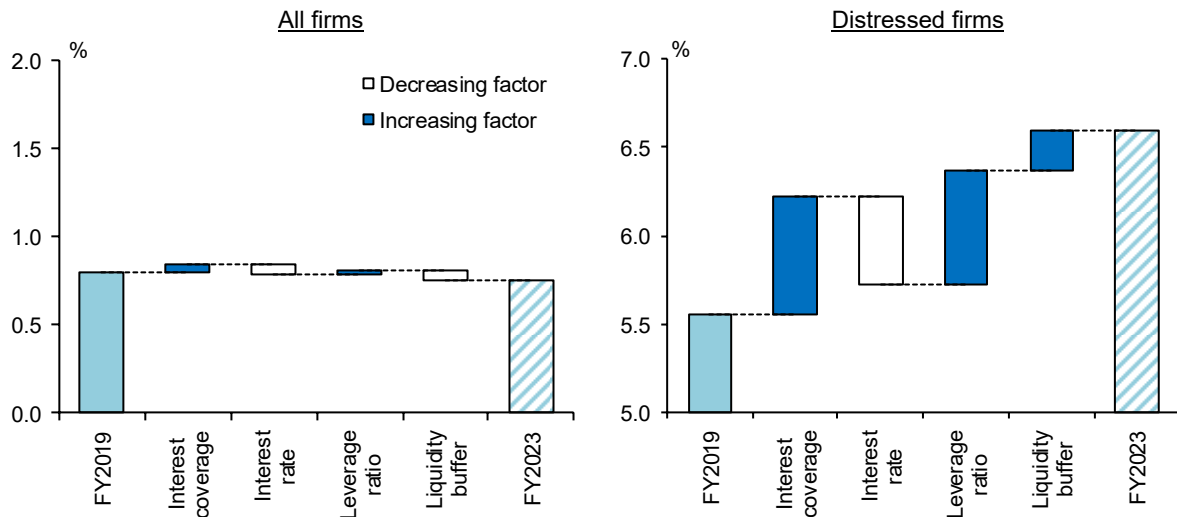
²⁹ Unless otherwise noted, the analysis in the right panel of Chart IV-1-6 and the subsequent charts cover firms contained in the CRD Association's Credit Risk Database for SMEs. The ratio of the number of SMEs (firms with sales of 100 million yen or more) to micro firms (firms with sales of less than 100 million yen) is roughly 1:1. The impact of zero-zero loans is calculated by assuming that the entire increase in borrowing in fiscal 2020 consisted of such loans. Further, (1) a loan period of 8 years, (2) a deferment period of 3 years, and (3) an interest rate paid by firms of 1.5 percent are assumed.

³⁰ For details on financial characteristics of distressed firms, see Section A of Chapter IV in the April 2023 issue of the *Report*.

classification of "special attention" or below, or (3) subject to subrogation by a credit guarantee corporation, within one year for the first time. On this basis, the probability of default of SMEs as a whole and distressed firms is estimated, and future developments in bankruptcies and defaults are examined.³¹

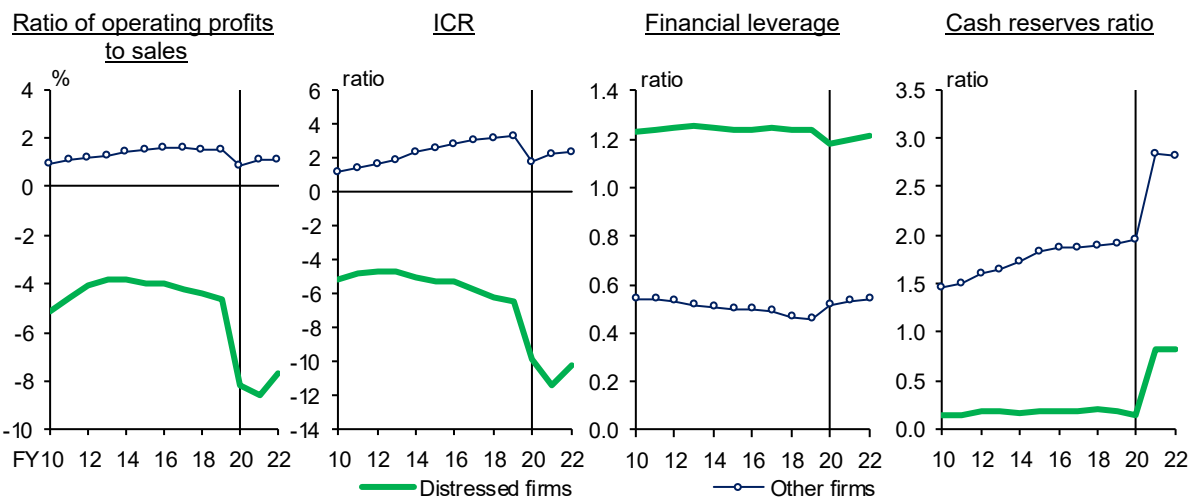
Chart IV-1-9 shows the probability of default estimates for SMEs and the factors behind changes in the probability of default. For SMEs as a whole, there is no significant difference between the

Chart IV-1-9: Probability of default for SMEs



Note: "Interest coverage" and "Liquidity buffer" indicate, respectively, the contribution of the kinked ICR and the ratio of cash reserves to total assets to the change in the probability of default.
Source: CRD Association; BOJ.

Chart IV-1-10: Financial indicators among distressed firms



Note: 1. Financial leverage is the ratio of borrowings to total assets. Cash reserves ratio is the ratio of cash reserves to short-term borrowings.
2. Shows the median values. The vertical lines indicate the beginning of the pandemic. The charts cover SMEs.
Source: CRD Association.

³¹ The probability of default was estimated using a default model that explicitly takes firms' cash reserves into account. The dependent variable of the model is a dummy variable representing whether a firm defaults over the next year. Explanatory variables are the short-term cash surplus/shortage ratio (cash reserves/total assets), the financial leverage, the borrowing interest rate, and the kinked ICR. The estimation period is from fiscal 2003 to fiscal 2019. Firms' financial conditions for fiscal 2023 are assumed based on projections for small firms in the same industry for fiscal 2023 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.

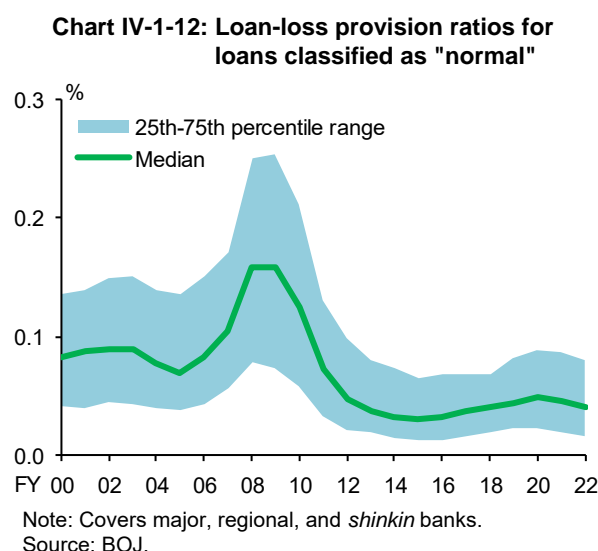
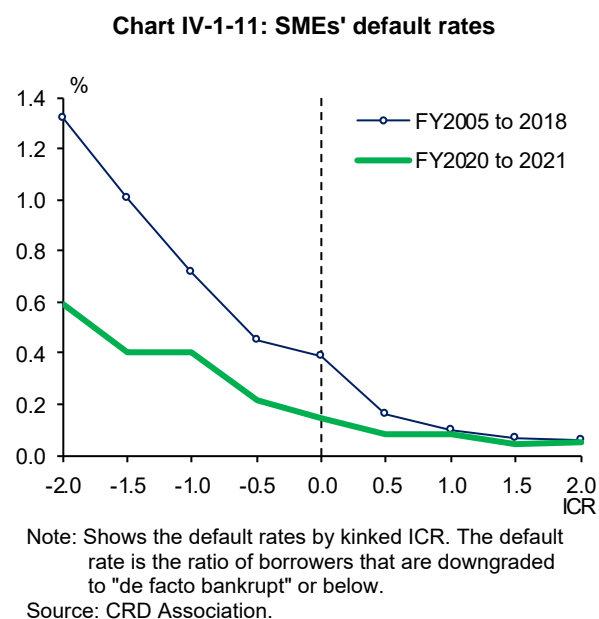
For details on the default model, see Box 4 of the October 2020 issue of the *Report*.

IV. Risks faced by financial institutions
A. Credit risk

probability of default for fiscal 2019 just before the pandemic and, most recently, that for fiscal 2023. Even with principal and interest repayments on zero-zero loans beginning in full, the increase in the liquidity buffer due to pandemic-related loans and various subsidies restrains defaults. In contrast, for distressed firms, which have experienced a deterioration in their business since before the pandemic, its effectiveness in curbing defaults has been weakening. The decline in liquidity buffers, in addition to interest payment burden and leverage ratios, pushes up the probability of default. Because these firms have seen a further increase in their operating losses since the outbreak of the pandemic, their interest payment burden relative to profits has been on the rise, leading to a continued decline in their liquidity buffer (Chart IV-1-10).

Caveats with regard to credit risk management

Banks need to strengthen their management of credit exposures to, and support for, such firms with high credit risk. The actual default rate in recent years -- the percentage of firms downgraded to "de facto bankrupt" or below at each point in time -- has been pushed down substantially by the strong corporate financing support measures since the outbreak of the pandemic (Chart IV-1-11). With economic activity returning to normal, the default rate is expected to return to its through-the-cycle average, after smoothing out the effects of the business cycle.



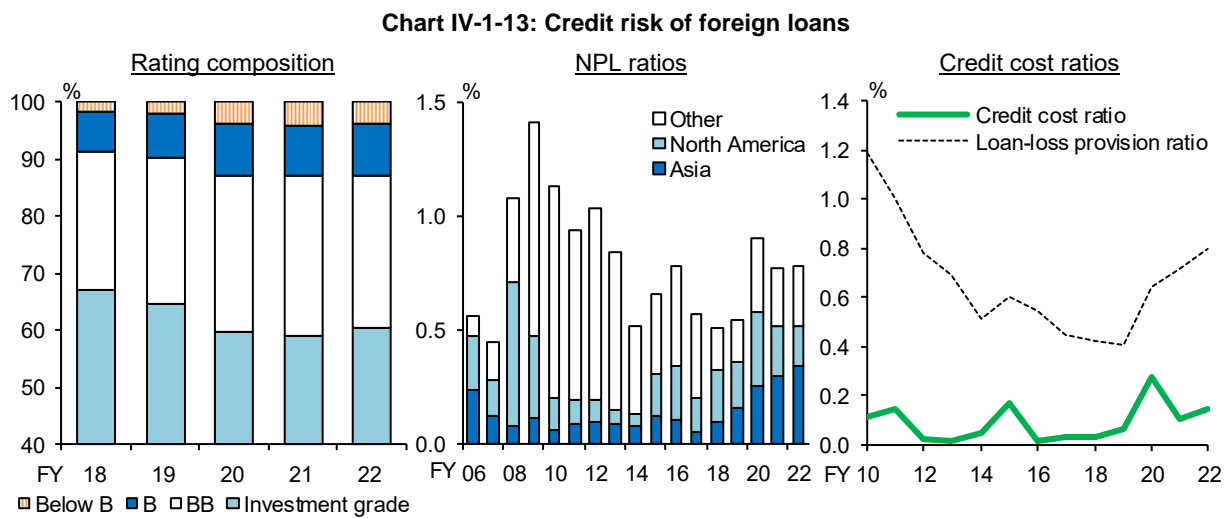
As mentioned earlier, the profitability of distressed firms has deteriorated further (Chart IV-1-10). Their interest coverage ratio (ICR), which represents their interest payment burden, is negative. Their financial leverage has remained high due to the lack of progress in loan repayments. These distressed firms are also exposed to refinancing risk. Their cash reserves ratio relative to short-term borrowings is also low.

Banks need to accelerate their support for borrowers' core business to improve their business conditions, including the use of COVID-19 refinancing guarantees. Firms that have been in distress for a long time are difficult to revive due to the deterioration in profitability and ICR. It is important that banks provide support that is suited to their borrowers' actual condition, including support for existing firms to start new core businesses and support for the closure of the business and business take-overs. As also highlighted in previous issues of the *Report*, banks' loan-loss provision ratios have been low, reflecting the decline in downgrades (Chart IV-1-12). To provide continued support to firms, it is also important that banks have sufficient provisions.

2. Foreign credit risk

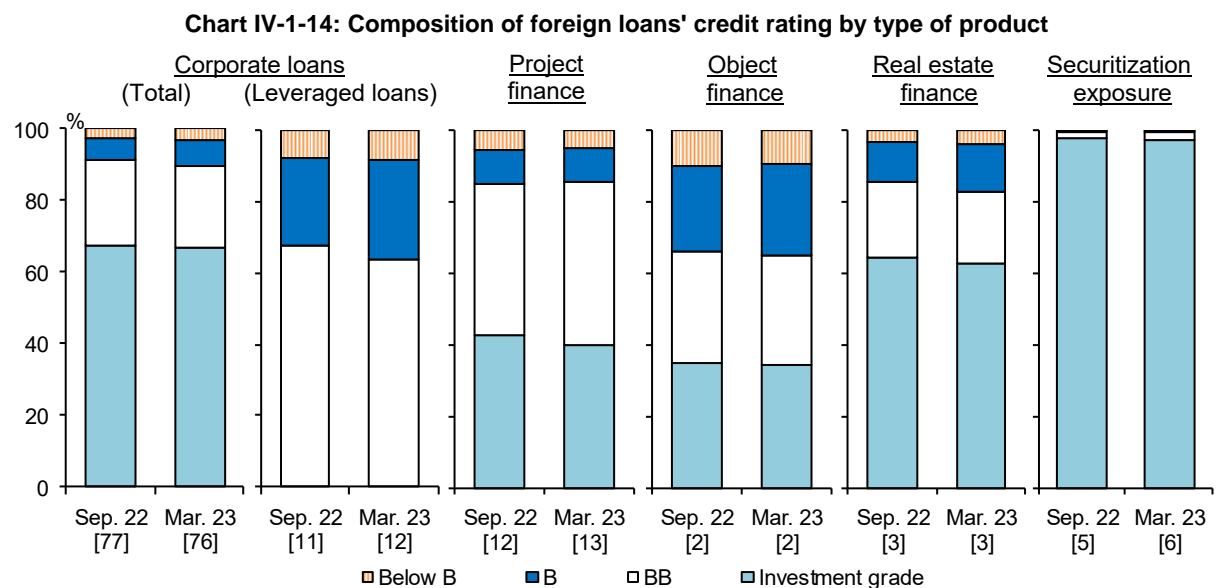
Foreign credit risk has been kept low even amid the global tightening of financial conditions (Chart IV-1-13). The share of investment grade loans has remained high. As major banks have endeavored to expand their international business, the share of investment grade loans declined temporarily, but it has bottomed out recently. Downgrades of borrowers due to an increase in firms' interest payments have been limited to date. Meanwhile, non-performing loan (NPL) ratios and credit cost ratios have been flat. Loan-loss provisions have been at relatively high levels, partly due to forward-looking loan-loss provisioning amid the situation of a series of risk events such as the outbreak of the pandemic and the downgrading of Russia-related loans and a major real estate developer in China.

There has been no major change in the credit risk of foreign loans by type of product (Chart IV-1-14). Investment grade loans have continued to account for almost 70 percent of corporate loans



Note: The left-hand chart covers the three major banks (based on the internal rating of each bank); the middle chart covers the three major banks (on a non-consolidated basis); the right-hand chart covers the international business of the three major banks (on a non-consolidated basis).

Source: Published accounts of each bank; BOJ.



Note: 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.

IV. Risks faced by financial institutions
A. Credit risk

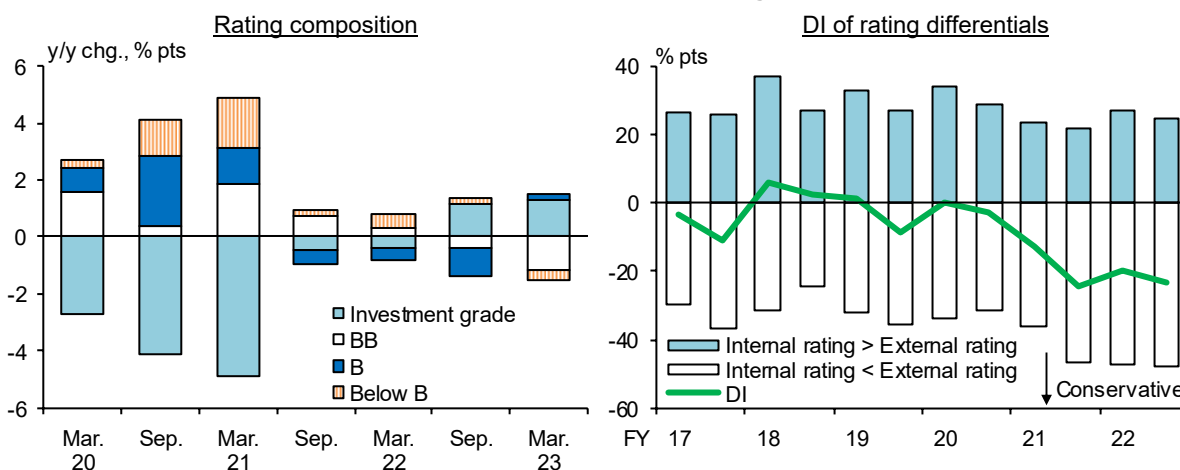
on the whole, although the share of B-rated loans has increased somewhat for unsold leveraged loans as well as for real estate finance where market conditions have deteriorated. Regarding project finance loans and object finance loans, which entail relatively high risk, the share of investment grade loans is unchanged. For project finance loans, downgrades of loans to the energy as well as electricity and gas-related industries have been limited. For object finance loans, aircraft-related demand is expected to improve. On the whole, the quality of banks' foreign loan portfolios has been maintained.

However, uncertainty with regard to the foreign loan market remains high. The lending stance of some U.S. and European banks has become more cautious, triggered by a run on deposits in March 2023, in addition to continuing monetary tightening and resultant growing concerns about a slowdown in foreign economies. Against this background, changes in major banks' foreign loan risk profiles continue to warrant close monitoring. This subsection updates the three changes highlighted in the previous issue of the *Report* -- i.e., changes in the composition of loans, the improvement in lending-deposit interest margins, and the increasing trend to larger loans and loan concentration.

Changes in the composition of loans

Banks have changed the composition of loans to further reduce risks (Chart IV-1-15). As seen in Section A of Chapter III, major banks have become more selective in their foreign lending. While these banks have been active in meeting demand for funds from investment grade firms, particularly in the United States and Europe, they have been cautious about extending loans to high-risk borrowers. Major banks have been conservative in their risk assessment, setting internal credit ratings at lower levels than external ratings. By type of loans, they have reduced leveraged loans and loans to low-return borrowers. They have also reduced loans to the Chinese economy and its peripheral economies, where adjustment pressure remains in the real estate market and there are concerns over frictions with the United States. Loans to the Asia-Pacific (APAC) region have been on a clear declining trend (Chart III-1-14).

Chart IV-1-15: Risk profiles of foreign loans

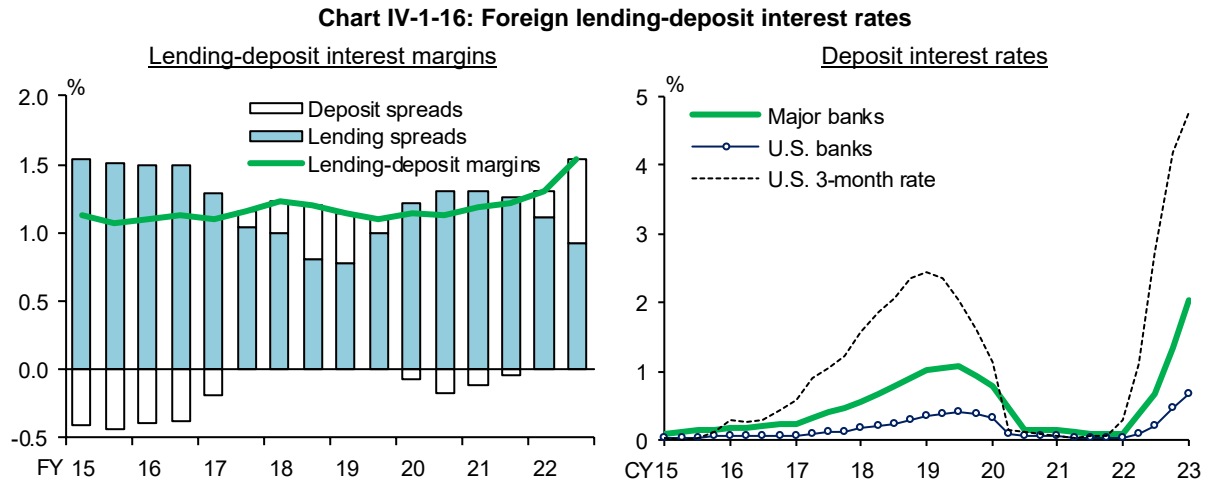


Note: The left-hand chart covers the three major banks (based on the internal rating of each bank); the right-hand chart covers the three major banks' large borrowers.
Source: Moody's; BOJ.

There have been changes in loan demand as well. Demand for working capital that reflects the rise in raw material input costs and labor costs has subsided, due in part to the impact of successive policy rate hikes. The shift from funding through bond issuance to borrowing has been sluggish. Drawdowns of committed lines at major banks have also come to a halt.

Improvement in lending-deposit interest margins

Foreign lending-deposit interest margins have continued to improve together with the rise in market interest rates (Chart IV-1-16). About 90 percent of major banks' foreign loans consist of floating-rate loans. This is why the interest rate pass-through to loans has been relatively high. However, lending spreads (loan interest rates minus base rates) have been pushed down by an increase in loans with a relatively high rating that reflects major banks' selective lending stance.³²



Note: 1. In the left-hand chart, deposit/lending spreads are the differences between deposit/lending rates and base rates (the U.S. 3-month rate), respectively. The chart covers the international business of the three major banks (on a non-consolidated basis).
 2. In the right-hand chart, "Major banks" covers the international business; "U.S. banks" shows the medians of U.S. banks with total assets of 10 billion U.S. dollars or more.

Source: FFIEC; FRB; BOJ.

Meanwhile, deposit spreads (base rates minus deposit interest rates) have continued to widen. The interest rate pass-through to deposit funding at Japanese banks has remained relatively low, partly because U.S. banks have kept their pass-through rate low. The improvement in lending-deposit interest margins has led to an improvement in profit buffers, which represent one element of banks' loss-absorbing capacity (see Section B of Chapter V on the relationship between interest margins and profit buffers).

Trend to larger loans and loan concentration

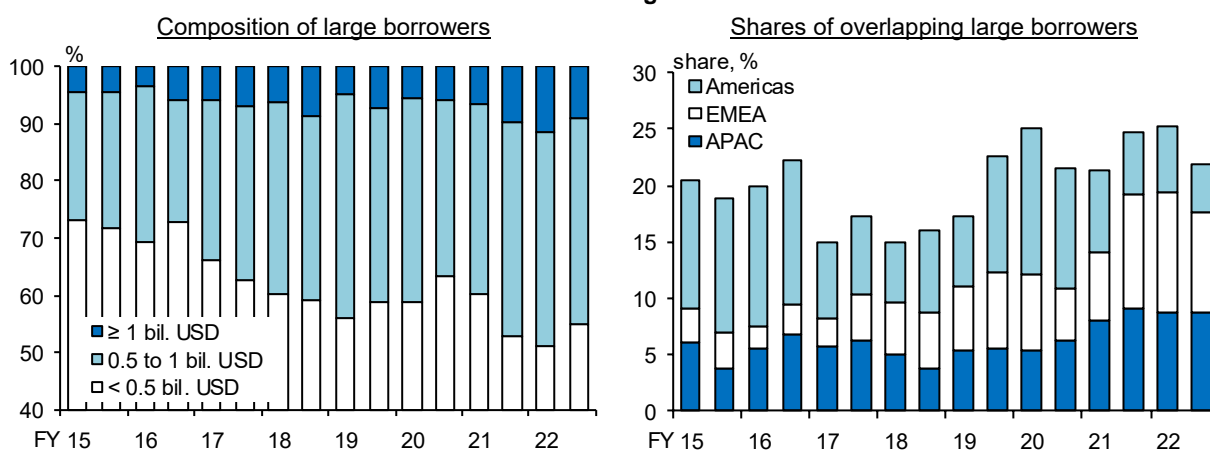
Foreign loans have continued to be large (Chart IV-1-17).³³ Looking at the loan amount per large borrower, the share of relatively large loans has increased. Regarding loans to the APAC region, there has been an increase in the number of borrowers overlapping among major banks. The trend toward larger loans and loan concentration have been driven by the fact that major banks, in order to strengthen their relationships with their clients, have been responding to the loan demand of commodity traders and investment funds. When large loans represent common exposures, in response to a foreign shock, the loan portfolios of major banks are more likely to be synchronized and the impact on the financial system to be greater.

³² The negative spread between long- and short-term market interest rates has also put downward pressure on lending spreads.

³³ Chart IV-1-17 targets the pre-identified large borrowers of the three major banks. Therefore, the increasing size of large loans discussed in this section strictly refers to the increasing size of large foreign loans, rather than to the increasing size of total foreign loans.

IV. Risks faced by financial institutions
A. Credit risk

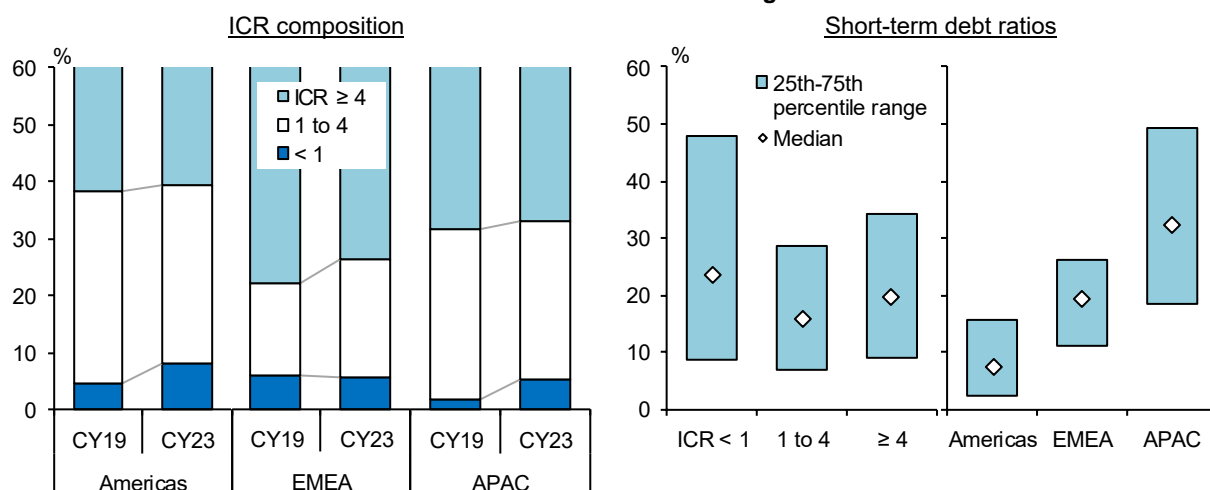
Chart IV-1-17: Large borrowers



Note: 1. The left-hand chart covers the three major banks' large borrowers (non-Japanese firms).
2. The right-hand chart shows the shares of outstanding loans to large borrowers that overlap for all three major banks. Covers the three major banks' large borrowers.
Source: BOJ.

Looking at borrowers overall, a deterioration in their ICRs, which represent interest payment burdens, has been avoided, reflecting strong sales, even with a rise in funding costs.³⁴ The percentage of firms with an ICR of less than one -- i.e., firms that cannot cover their interest payments with their profits from core business alone -- has increased only slightly (Chart IV-1-18). However, if there is a substantial economic slowdown going forward, putting downward pressure on firms' profits, a deterioration in ICRs is inevitable. Moreover, many low-ICR firms have high short-term debt ratios (short-term debt/interest-bearing debt). This is particularly the case for firms in the APAC region, for which one-third of interest-bearing debt will mature within one year. Refinancing risk associated with such debt therefore warrants attention.

Chart IV-1-18: Risks associated with large borrowers



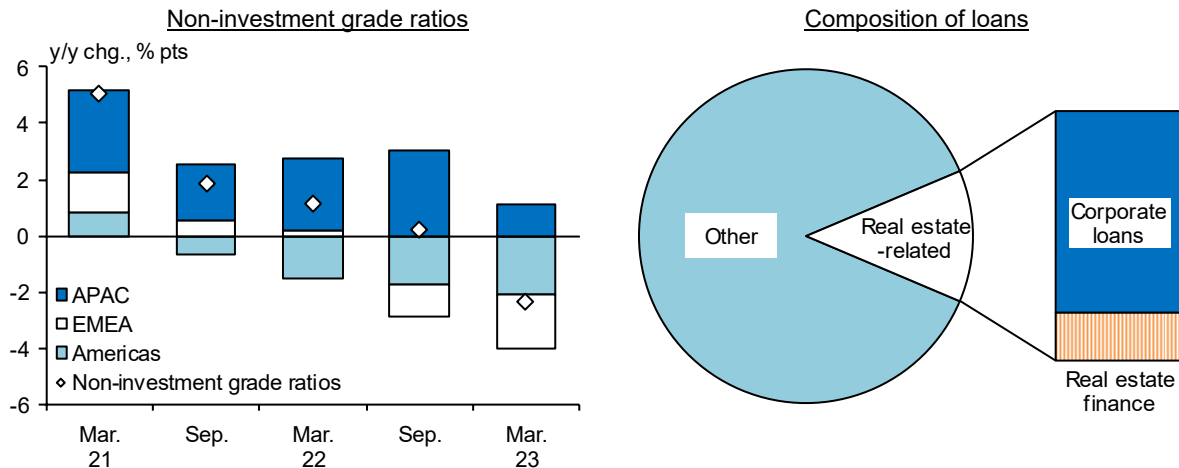
Note: In the left-hand chart, "CY19" and "CY23" indicate December 2019 and June 2023, respectively. The right-hand chart is as of June 2023. The charts cover the three major banks' large borrowers.
Source: S&P Global Market Intelligence; BOJ.

Foreign real estate markets have been gradually experiencing correction. Looking at major banks' real estate-related loans, the shares of non-investment grade loans to the Americas and the Europe, Middle East, and Africa (EMEA) region have declined, avoiding a deterioration in the quality of

³⁴ It has been pointed out that firms' preference for long-term fixed-rate funding (i.e., borrowing and bond issuance) during the phase of low interest rates has created a time lag in the impact of policy rate hikes on firms' ICRs.

overall real estate loan portfolios (Chart IV-1-19). However, the share of non-investment grade loans in the APAC region, which is more susceptible to developments in the Chinese real estate market, has been rising. This tendency is seen in both corporate loans and real estate finance. In addition, among loans to real estate investment funds, especially in the Americas, the quality of some loans for office buildings has deteriorated. While major banks' real estate-related loans account for only 10 percent of their total foreign loans, banks need to continue with refined credit risk management that takes into account the risk-return balance, including decisions on additional loans and forward-looking management of existing loans.

Chart IV-1-19: Risks associated with real estate-related loans

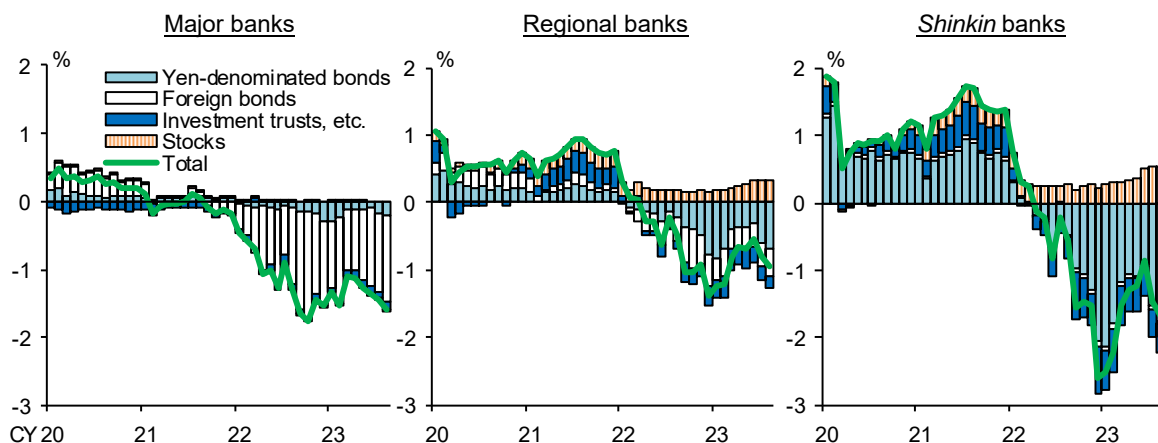


Note: Covers the three major banks. The right-hand chart is as of end-March 2023.
Source: BOJ.

B. Market risk associated with securities investment

Banks' securities portfolios show that, despite the rise in domestic and foreign interest rates, the increase in valuation losses on securities (including held-to-maturity securities and excluding strategic stockholdings) has been limited compared to the beginning of 2023 (Chart IV-2-1). The rebalancing of interest-rate portfolios likely has contributed to this situation. However, interest rate products have continued to register net valuation losses. Given that U.S. and European policy rates could remain higher for longer, the risk of negative interest margins and valuation losses continues to warrant close monitoring.

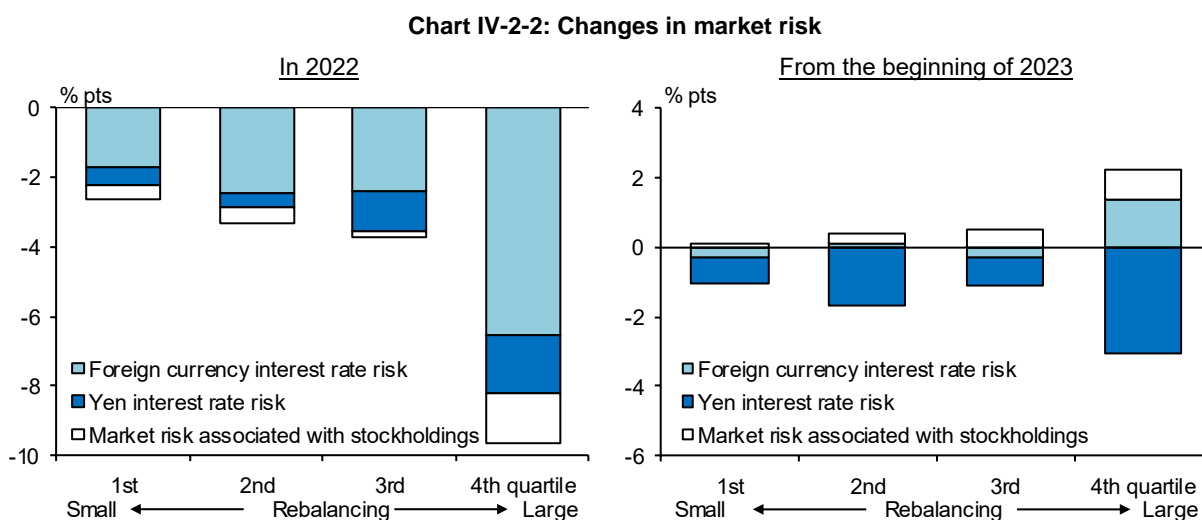
Chart IV-2-1: Valuation gains/losses on securities holdings



Note: 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 2023.
Source: BOJ.

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

Looking back at banks' investment behavior during 2022, market risk -- 100 basis point value (BPV) for yen interest rate risk, 200 BPV for foreign currency interest rate risk, and market value fluctuations when stock prices fell 10 percent for equity risk -- was reduced, especially foreign currency interest rate risk (left panel of Chart IV-2-2).³⁵ The reduction in market risk was most pronounced among banks in the fourth quartile, i.e., those that were the most active in terms of rebalancing their portfolios. Many of these banks reduced their foreign bond positions, particularly low-yielding bonds with a high risk of a negative interest margin and long-duration bonds with a high risk of valuation losses.



Note: 1. Shows the medians of changes in market risk as ratios to capital for each quartile of the degree of rebalancing. The right-hand chart shows the changes through August 2023.
 2. "Yen interest rate risk" refers to a 100 BPV; "Foreign currency interest rate risk" refers to a 200 BPV; "Market risk associated with stockholdings" refers to valuation changes in response to a 10% decline in the stock price index.
 Ratios to capital are calculated using Tier 1 capital for internationally active banks and core capital for domestic banks.
 Source: BOJ.

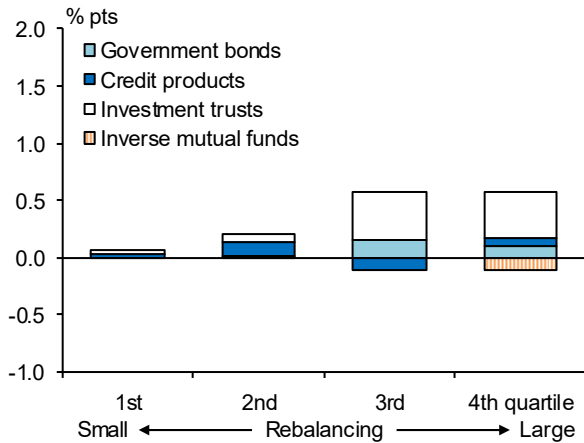
Banks' investment behavior has become more diverse since the start of 2023 compared to 2022, when banks were cautious about taking risks. Banks in the fourth quartile have restored some of their foreign bond positions that they had reduced in 2022 (right panel of Chart IV-2-2). On the other hand, they have further reduced their yen-denominated bond positions, reflecting expectations for revisions to monetary policy. Their market risk associated with stockholdings has increased marginally on the whole due to the rise in stock prices. This section provides an overview of changes in market risk profiles associated with banks' investment behavior.

Restoration of foreign bond positions

Changes in positions of foreign bond portfolios show that banks in the third and fourth quartiles, which rebalanced significantly during 2022, have increased their positions again since the start of 2023 (Chart IV-2-3). The main objective is to earn interest income. However, few banks have restored their original positions, given the risk of negative interest margins and valuation losses. Instead, most of the increase in foreign bond positions consists of foreign bond investment trusts, which aim at diversification of investments.

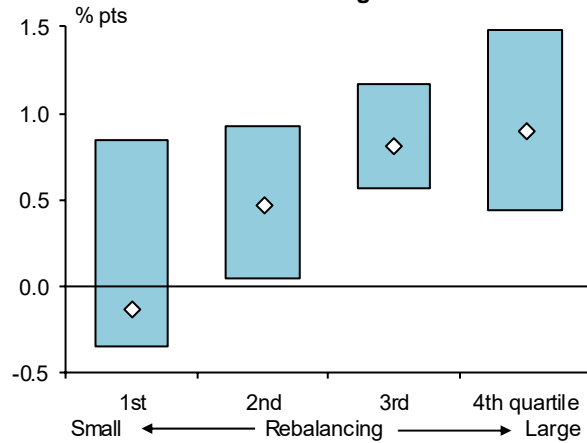
³⁵ Here, losses on sales (specifically, the ratio of losses on sales to capital) during 2022 are used as a proxy for securities rebalancing (i.e., the replacement of products). Banks that rebalanced significantly in 2022 were those that, to start with, had high loss-absorbing capacity, such as high capital adequacy ratios and ample room for realizing gains. For details, see Section C of Chapter IV in the April 2023 issue of the *Report*.

Chart IV-2-3: Changes in foreign bond positions



Note: For each quartile of the degree of rebalancing, shows the medians of changes from December 2022 to June 2023 in the ratio of foreign currency interest rate products to securities holdings.
Source: BOJ.

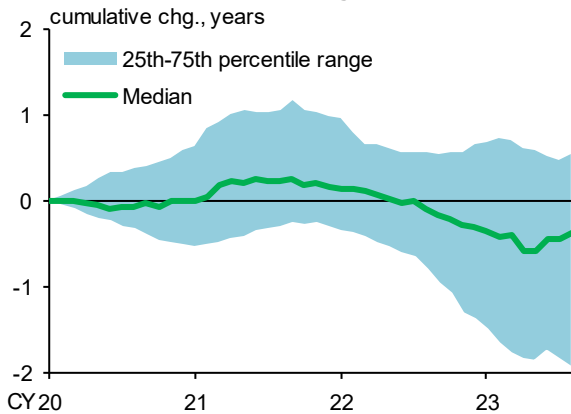
Chart IV-2-4: Changes in yields on foreign bondholdings



Note: For each quartile of the degree of rebalancing, shows the medians (markers) and 25th-75th percentile ranges (bands) of changes from December 2021 to June 2023 in the yields on foreign bonds and foreign bond investment trusts holdings.
Source: BOJ.

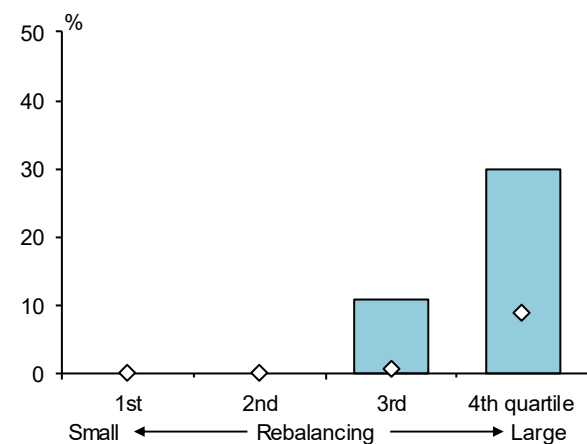
In addition, as a result of rebalancing since last year, banks have reconfigured their portfolios, increasing their holdings of bonds with higher yields and shorter average durations (Charts IV-2-4 and IV-2-5). The improvement in bond yields and shorter durations is particularly pronounced at banks in the third and fourth quartiles. At the same time, these banks have strengthened their hedging against the risk of higher interest rates (Chart IV-2-6). Amid the heightened volatility in foreign interest rates, the use of interest rate hedging is an effective option.

Chart IV-2-5: Changes in duration of foreign bondholdings



Note: 12-month backward moving averages. The chart covers regional banks. Latest data as of August 2023.
Source: BOJ.

Chart IV-2-6: Hedge against foreign currency interest rate risk



Note: For each quartile of the degree of rebalancing, shows the medians (markers) and 25th-75th percentile ranges (bands) of hedge ratios against foreign currency interest rate risk. Averages for May-July 2023.
Source: BOJ.

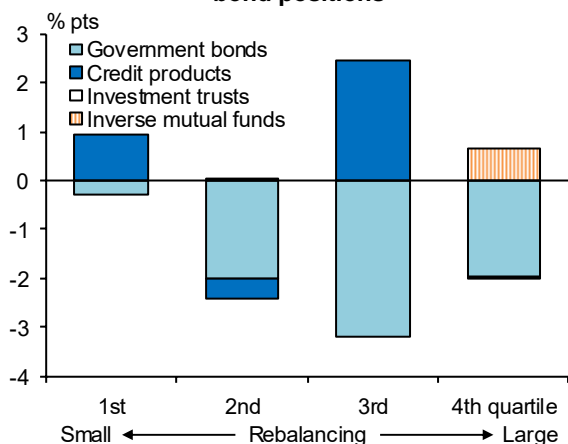
Reduction of yen-denominated bond positions

Whereas banks have started to restore foreign bond positions after rebalancing, they are in the process of rebalancing their yen-denominated bond positions. Amid expectations for revisions to monetary policy, banks have generally become cautious about holding JGBs and have reduced such holdings across the board (Chart IV-2-7). JGB holdings declined not only at banks in the third

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

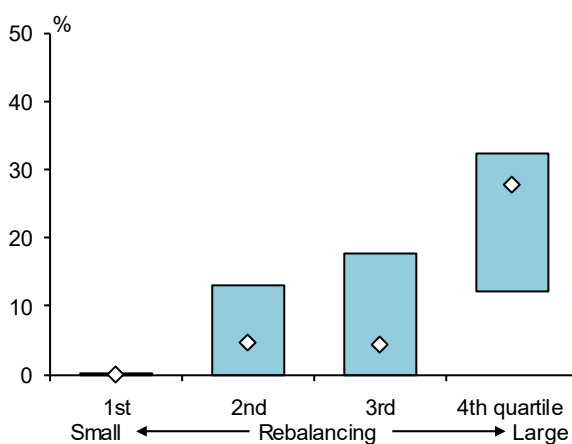
and fourth quartiles, which rebalanced in 2022, but also at banks in the second quartile. In addition, these banks have strengthened their hedging against the risk of rising interest rates (Chart IV-2-8). The main reason for the increase in yen-denominated bond positions among banks in the fourth quartile is the purchase of inverse mutual funds for interest rate hedging (Chart IV-2-7).³⁶ For all types of banks, interest rate hedge ratios have been at high levels not seen in recent years.

Chart IV-2-7: Changes in yen-denominated bond positions



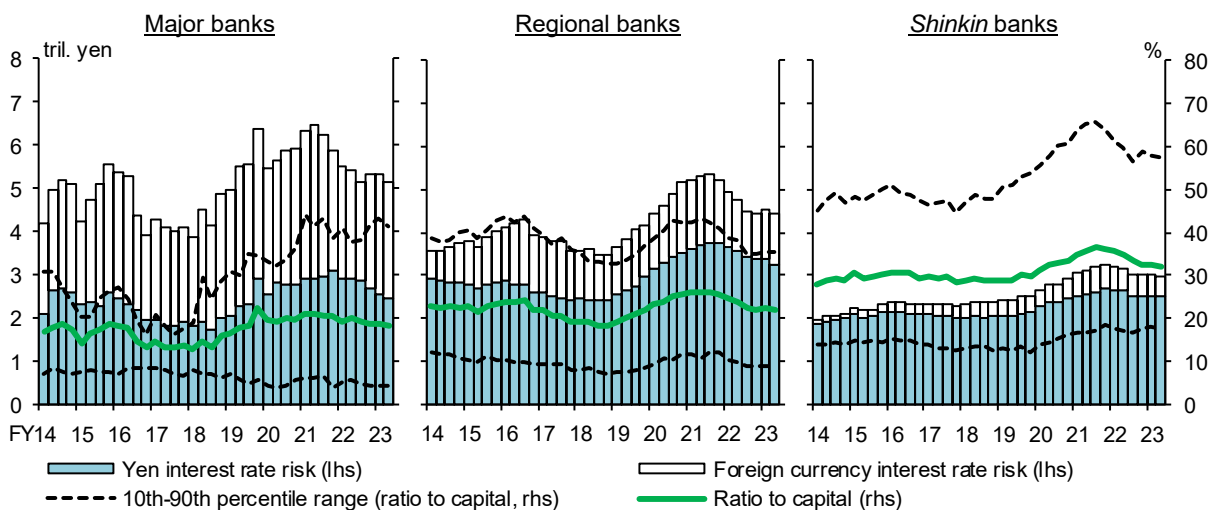
Note: For each quartile of the degree of rebalancing, shows the medians of changes from December 2022 to June 2023 in the ratio of yen interest rate products to securities holdings.
 Source: BOJ.

Chart IV-2-8: Hedge against yen interest rate risk



Note: For each quartile of the degree of rebalancing, shows the medians (markers) and 25th-75th percentile ranges (bands) of hedge ratios against yen interest rate risk. Averages for May-July 2023.
 Source: BOJ.

Chart IV-2-9: Interest rate risk of securities holdings



Note: 1. "Yen interest rate risk" is a 100 BPV and "Foreign currency interest rate risk" is a 200 BPV. Off-balance-sheet transactions are included for foreign currency interest rate risk. Latest data as of August 2023.
 2. "Ratio to capital" is calculated using CET1 capital for internationally active banks and core capital for domestic banks (excluding the transitional arrangements).
 Source: BOJ.

As a result of these adjustments to yen-denominated and foreign bond positions, the amount of

³⁶ Some banks, including a few major banks, hold securities for a held-to-maturity purpose. By doing so, they no longer need to perform daily mark-to-market valuations, thereby reducing the risk of valuation losses. However, even for held-to-maturity securities, banks still need to manage the risk of impairment losses and negative interest margins. Against this background, in Chart IV-2-1, valuation gains/losses on held-to-maturity securities are also included in the calculation.

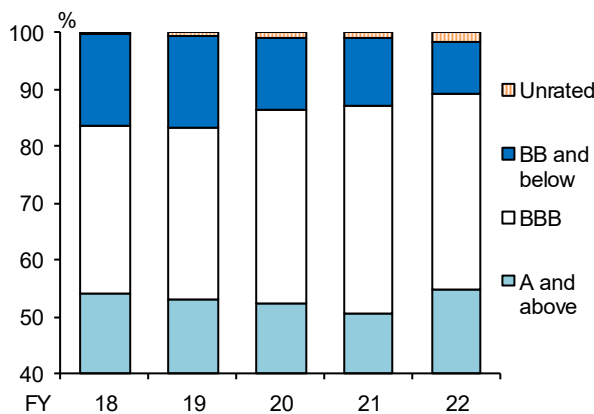
interest rate risk associated with banks' securities investment has declined (Chart IV-2-9).³⁷ However, the total amount of interest rate risk has remained at a historically elevated level. The interest rate risk-to-capital ratio has been around 20 percent for major banks, around 25 percent for regional banks, and around 35 percent for *shinkin* banks. For some banks, the ratio is significantly above the average of banks of the same type.

Shift from interest rate risk to market credit risk

Some of the interest rate risk reduced by the recent rebalancing has been replaced by market credit risk. As mentioned earlier, a large part of the increase in foreign bond positions since the start of 2023 consists of foreign bond investment trusts. These invest in a wide range of products, including credit products. As shown in Chart IV-2-7, banks in the third quartile have been increasing their purchases of domestic credit products such as corporate bonds. Against this background, banks need to manage interest-rate portfolios appropriately based on changes in the risk profile of each product.

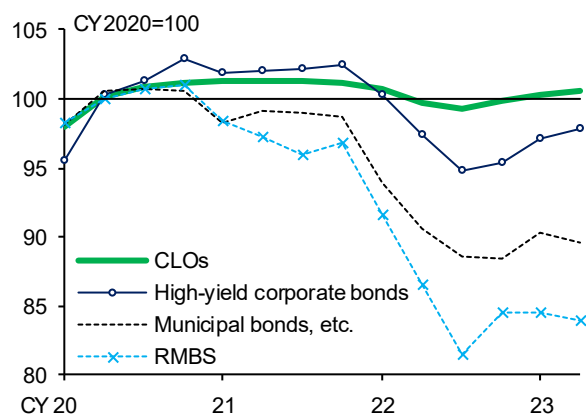
Most of the foreign credit products held by banks have been investment-grade bonds (Chart IV-2-10). According to reports from banks, their holdings of securitized products, including CLOs -- credit products that are backed by leveraged loans -- have continued to consist almost entirely of AAA-rated tranches. However, prices of foreign credit products (excluding floating-rate CLOs) have declined due to the recent rise in interest rates (Chart IV-2-11). If concerns over credit risk emerge, for example, with the real estate market gradually experiencing correction, prices of these products could decline further. Therefore, price fluctuations for foreign credit products and the risk of valuation losses warrant attention.

Chart IV-2-10: Rating composition of foreign credit products



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

Chart IV-2-11: Prices of credit product holdings



Note: Calculated based on foreign credit products held by regional and *shinkin* banks. Latest data as of June 2023.
Source: BOJ.

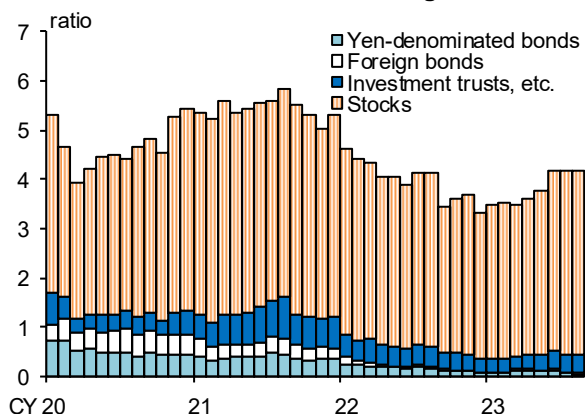
In addition, since the start of the policy rate hikes in the United States and Europe, gross valuation gains on securities have declined significantly (Chart IV-2-12). Although valuation gains on stockholdings have increased due to the recent rise in stock prices, some banks that realized gains in conjunction with loss-cutting saw a reduction in their remaining valuation gains -- i.e., room for realizing gains (see Section A of Chapter V). For banks that maintained their positions, such as those in the first and second quartiles, the risk associated with rising interest rates has materialized

³⁷ In Chart IV-2-9, upward parallel shifts of 1 percentage point and 2 percentage points are assumed for yen interest rates and foreign currency (dollar and euro) interest rates, respectively, for all maturities, so that they are in line with the Financial Services Agency's public notice about interest rate risk in the banking book (IRRBB).

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

in the form of valuation losses. The increase in valuation losses, like realized losses, could lead to a decline in economic capital allocated to banks' market positions. While ample economic capital is allocated to banks' market positions at present, if the room for capital allocations becomes smaller, it will be more difficult for them to adjust positions in a flexible manner (Chart IV-2-13). Banks therefore need to continuously increase the sophistication of their risk management while taking into account the effect of future developments in interest rates and economic conditions on financial markets.

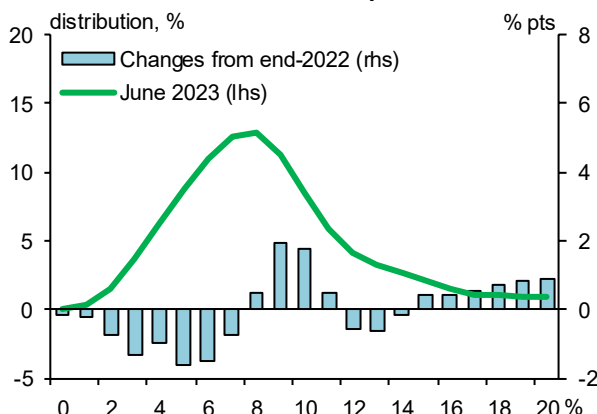
Chart IV-2-12: Gross valuation gains on securities holdings



Note: The ratio of gross valuation gains (excl. HTM securities and incl. strategic stockholdings) to PPNR excl. trading income and profits/losses on fund cancellations (3-year backward moving averages). Covers regional banks. Latest data as of August 2023.

Source: BOJ.

Chart IV-2-13: Distribution of the ratio of allocated capital



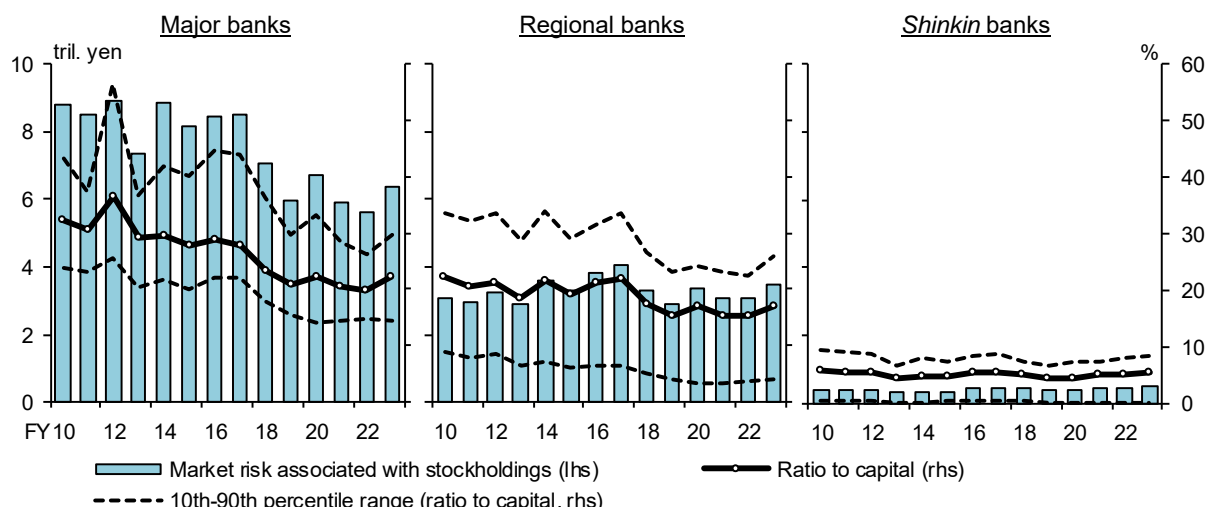
Note: Shows the distribution of the ratio of capital allocated to market positions to the outstanding amount of securities. Covers regional banks.

Source: BOJ.

Elevated market risk associated with stockholdings

Another important market risk is that associated with stockholdings. For major banks and regional banks, the amount of market risk associated with stockholdings remains at around 20 percent of their capital (Chart IV-2-14). This level is high enough to potentially have a substantial impact on

Chart IV-2-14: Market risk associated with stockholdings

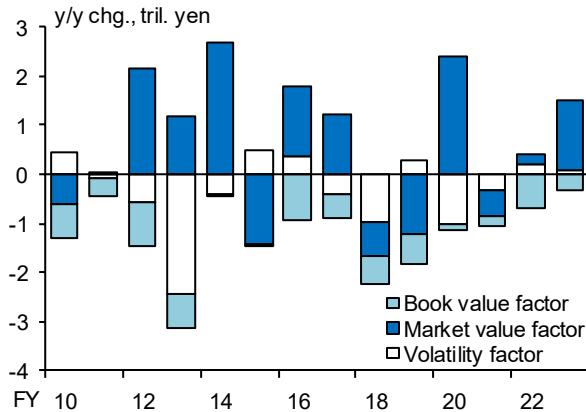


Note: 1. "Market risk associated with stockholdings" is VaR with a 99 percent confidence level and a 1-year holding period, and excludes risk associated with foreign currency-denominated stockholdings.
 2. "Ratio to capital" is calculated using CET1 capital for internationally active banks from fiscal 2012 onward, core capital for domestic banks from fiscal 2013 onward, and Tier 1 capital for all others (excl. the transitional arrangements).
 3. The data for fiscal 2023 are estimated using the outstanding amount of stockholdings as of end-August 2023 and stock prices up to end-August 2023.

Source: BOJ.

their balance sheets and profits. If market volatility were to increase, market risk associated with stockholdings could increase even more. The factors that determine the directions of such risk have been mixed recently (Chart IV-2-15). On the one hand, the "book value factor" has reduced market risk since last year on the back of the continued decline in strategic stockholdings and the realization of gains on stocks in conjunction with loss-cutting of interest rate products. On the other hand, the "market value factor" has increased market risk, reflecting the rise in stock prices since this spring (see Section B of Chapter II).

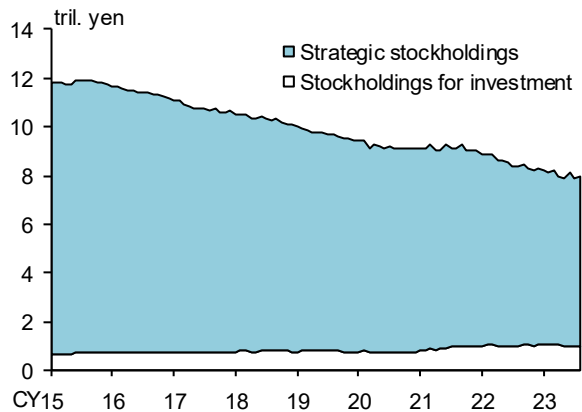
Chart IV-2-15: Factors affecting market risk associated with stockholdings



Note: 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. The data for fiscal 2023 are estimated using the outstanding amount of stockholdings as of end-August 2023 and stock prices up to end-August 2023.

Source: BOJ.

Chart IV-2-16: Outstanding amount of stockholdings by purpose



Note: Book value basis. Excludes stocks of subsidiaries and affiliated companies. Covers major and regional banks. Latest data as of August 2023.

Source: BOJ.

When banks hold stocks, an examination from a variety of perspectives is warranted. The first is credit risk management. If banks' stockholdings and loans have the same risk profiles, associated credit risks could materialize simultaneously in the event of stress. Given that the risk weighting of stocks will be gradually increased from the current 100 percent to 250 percent in the finalized Basel III regulations (see Section A of Chapter V), banks have reduced their strategic stockholdings in a phased manner (Chart IV-2-16).

The second perspective is capital policies. In terms of corporate governance, there are some cases where stockholders have opposed the election of top executives at banks with excessive strategic stockholdings to pressure them to improve their capital efficiency. Among some banks with strategic stockholdings, there has been demand from their stockholders for more payouts, such as higher dividends. In conducting capital policies, banks need to focus more on dialogue with stockholders.

The third is a risk and return perspective. Many of banks' strategic stockholdings have relatively high dividend yields and valuation gains. Stockholdings can therefore boost the performance of banks' securities investment through dividend income and gains on sales. In fact, during 2022, stockholdings worked as a buffer against the stress of rising interest rates at a large number of banks.³⁸ Banks need to make an objective assessment of the costs and benefits of stockholdings from various perspectives and keep the market risk associated with stockholdings within an appropriate range, in line with their loss-absorbing capacity. It is also important for banks to share

³⁸ For details, see Section C of Chapter IV in the April 2023 issue of the *Report*.

their policies with regard to holding and selling these stocks with a wide range of stakeholders.

C. Interest rate risk in the banking book

The U.S. bank failures in March 2023 drew attention to the interest rate risk in the banking book (IRRBB) inherent in the financial system and the intersection between interest rate risk and funding liquidity risk. Since then, comprehensive reviews of interest rate risk have been conducted not only in jurisdictions where interest rates rose significantly, but also in other jurisdictions and at international forums. The *Financial System Report* has also regularly examined interest rate risk and developments in core deposits, one of the factors that determine interest rate risk. Moreover, the previous issue of the *Report* examined the sensitivity of the foreign banking book to rising interest rates.³⁹ This section, in light of recent international developments, reviews the extent to which risks have built up, with a focus on interest rate risk in the domestic banking book, and revisits what determines the impact of interest rate fluctuations.

Note that the scenarios of rising interest rates -- a steepening and a parallel shift of the yield curve -- used in the interest rate risk analysis in this section, like the macro stress testing scenarios in Section B of Chapter V, are purely hypothetical and designed to effectively examine the resilience of the financial system. They represent neither the Bank's outlook nor the likelihood of any outcomes.

1. Changes in balance sheets over the medium to long term

Interest rate fluctuations affect the banking sector in Japan through various direct and indirect channels. Direct channels include (1) the shape of the yield curve, (2) banks' balance sheet structure (the duration gap between assets and liabilities), and (3) the pass-through of changes in market rates to interest rates on investment and funding products. These factors affect the interest rate risk of the banking sector -- such as the net interest income on loans and securities and valuation gains/losses on securities -- through changes in funding rates, such as interest rates on deposits, in investment yields on loans and securities, and in discount rates for mark-to-market accounting. The following reviews how the Japanese banking sector's balance sheet has changed in the low interest rate environment and how interest rate risk has fluctuated.

Expansion of balance sheets

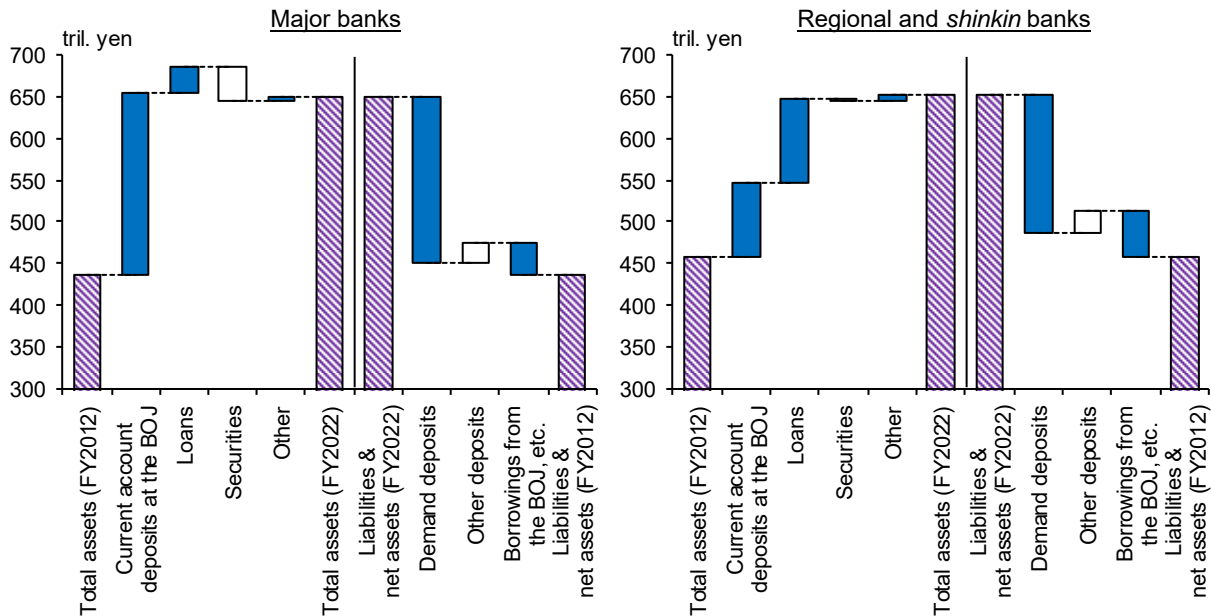
Looking at banks' yen balance sheets, both assets and liabilities increased over the 10-year period from the end of fiscal 2012 to that of fiscal 2022 for all types of banks (Chart IV-3-1). On the asset side, one reason for this move was the increase in loans. On the liability side, one reason was the increase in demand deposits. Moreover, under the Bank's large-scale monetary easing, both current account deposits at the Bank on the asset side and borrowings from the Bank on the liability side increased.

During this period, both the loan-to-deposit gap and the securities-to-deposit gap showed an excess of deposits (Chart IV-3-2). The increase in deposits since the outbreak of the pandemic has also contributed to this excess. This trend toward excess deposits is quite notable when compared to the foreign currency balance sheet. In their foreign currency balance sheets, banks' loans are in excess of deposits, and the loan-to-deposit gap is filled through market funding. Therefore, while

³⁹ For details, see Box 4 in the April 2023 issue of the *Report*.

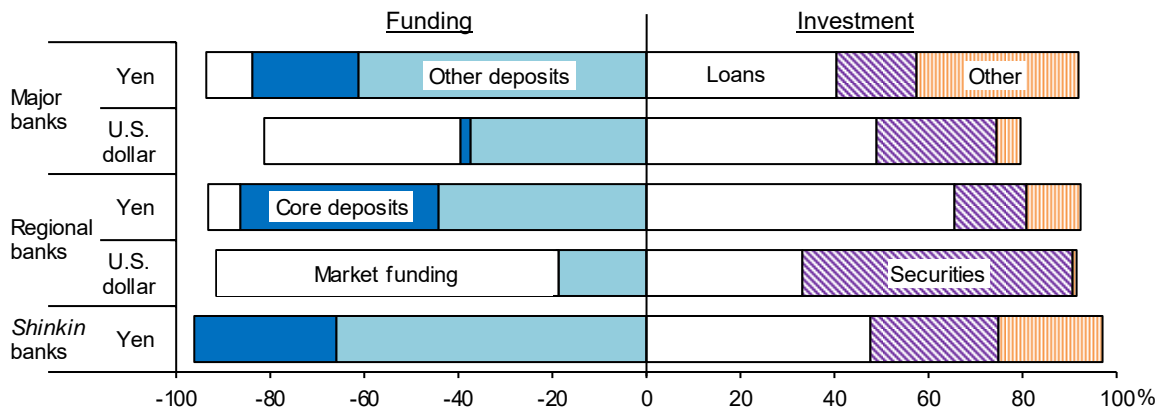
the stability of banks' liabilities in their foreign currency balance sheets greatly depends on market funding, it is more dependent in their yen balance sheets on deposits, especially core deposits.⁴⁰

Chart IV-3-1: Changes in assets and liabilities



Note: Covers the domestic business sector. "Current account deposits at the BOJ" for *shinkin* banks includes deposits at the Shinkin Central Bank.
Source: BOJ.

Chart IV-3-2: Composition of assets and liabilities



Note: "Other" refers to the net position of other investments and funding. Data as of end-March 2023.
Source: BOJ.

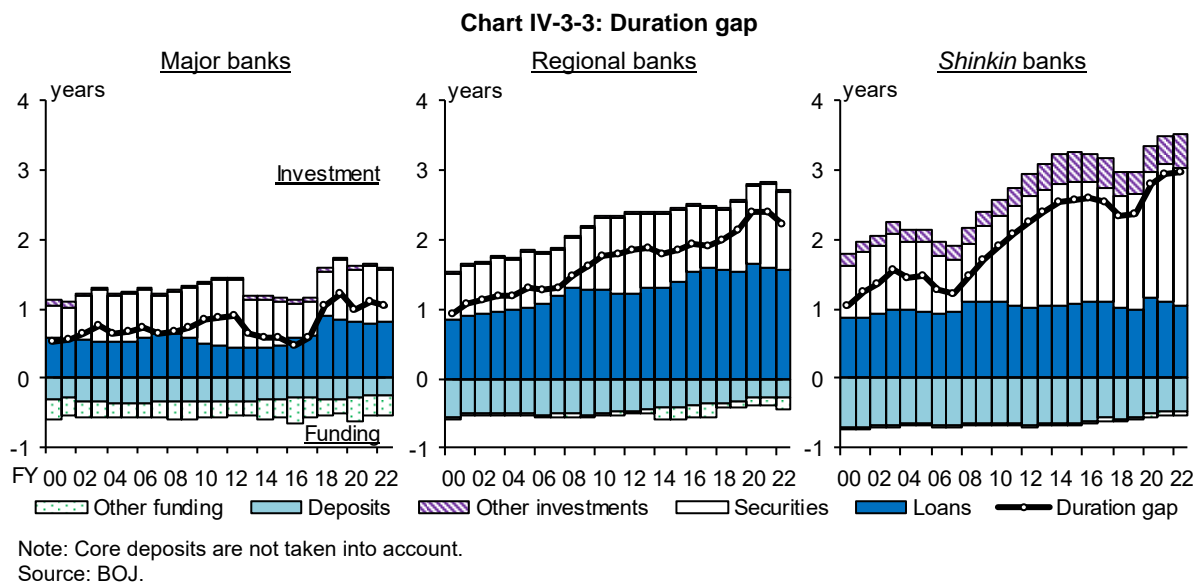
Widening of the duration gap

In terms of banks' yen balance sheets, not only have assets and liabilities increased, but the duration gap -- the difference between repricing schedules of interest payment for assets and liabilities (not taking core deposits into account) -- has also grown (Chart IV-3-3). By type of bank, the duration gap at major banks is unchanged after widening in the late 2010s. This is due to the

⁴⁰ Of deposits that contractually have no maturity and can be withdrawn at any time, such as ordinary deposits, core deposits refer to sticky deposits, which are actually not withdrawn and remain in an account for a long time. In general, core deposits are less sensitive to interest rate changes. The residual maturity composition of core deposits is longer for some banks than others. In this section, unless otherwise noted, core deposits are treated as demand deposits with a duration of three months or less, with a view to assessing interest rate risk in a conservative manner.

IV. Risks faced by financial institutions
 C. Interest rate risk in the banking book

lengthening of asset durations accompanied by the increase in long-term fixed-rate loans. In particular, seizing the opportunity of the significant decline in long-term interest rates in 2016, large firms increased borrowing at low long-term fixed rates, which widened the duration gap. This is still having an effect on the balance sheets of major banks. The percentage share of fixed-rate loans has increased from a little over 10 percent in fiscal 2012 to slightly more than 30 percent most recently.



Regional and *shinkin* banks' duration gap has been widening. For both, shortening in the duration of liabilities accompanied by the decline in time deposits has widened the gap. Against the backdrop that the interest rate gap between time deposits and demand deposits has narrowed, demand deposits have been relatively more preferred. In addition, amid sluggish corporate lending, regional banks have increased long-term lending, including real estate loans. This has led to a longer duration of assets. Meanwhile, *shinkin* banks have shifted to investments in long-term bonds in order to secure interest margins on securities investment, which has led to a longer duration of assets.

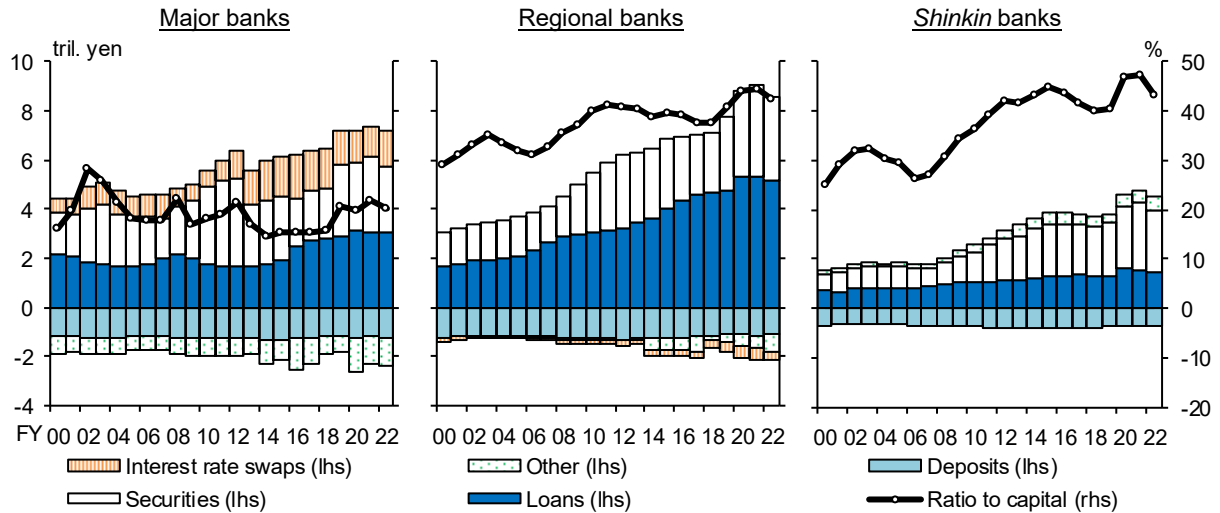
Increase in interest rate risk

Yen interest rate risk (in terms of the 100 BPV; not taking core deposits into account), which reflects the outstanding amount of assets and liabilities and their duration gap (or residual maturity composition), has also increased compared to a decade ago, especially among regional and *shinkin* banks (Chart IV-3-4). Looking at the interest rate risk-to-capital ratio on the asset side (loans and securities), the ratio for major banks is unchanged at around 20 percent, while those for regional and *shinkin* banks were at around 40 percent most recently. For regional and *shinkin* banks, the longer duration of assets mentioned earlier has increased interest rate risk on the asset side. Specifically, for regional banks, interest rate risk on loans has increased, while for *shinkin* banks, interest rate risk on securities has increased. For some of these banks, the interest rate risk-to-capital ratio is significantly above the average for regional and *shinkin* banks overall.

It should be noted that the interest rate risk shown in Chart IV-3-4 does not take core deposits into account. In risk management, a portion of demand deposits are regarded as core deposits -- sticky deposits even with interest rate fluctuations -- that remain in place for a long period of time. Around 20 percent of banks regard the average maturity of core deposits as five years or longer. Looking at banks as a whole, interest rate risk taking core deposits into account is generally in balance

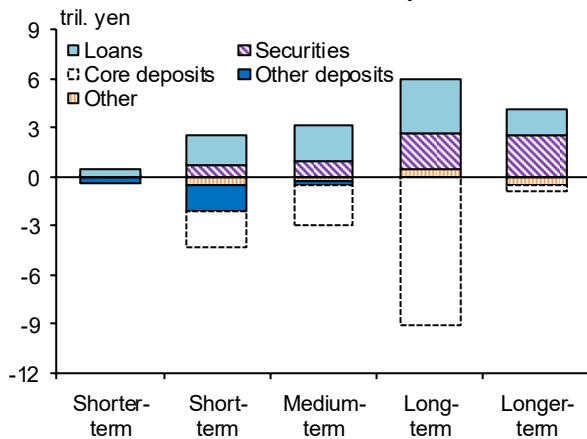
between assets and liabilities (Chart IV-3-5). Moreover, interest rate risk-to-capital ratios of individual banks taking core deposits into account are also below the supervisory thresholds (Chart IV-3-6).⁴¹ That said, the stickiness of deposits can change. The possibility that the stickiness of deposits might change therefore warrants attention (see Box 2).

Chart IV-3-4: Yen interest rate risk



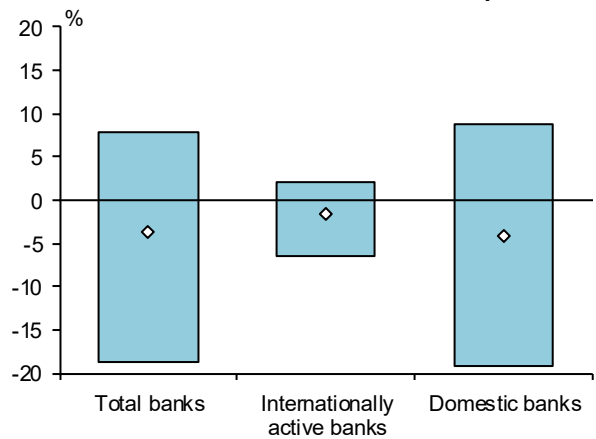
Note: Core deposits are not taken into account. "Ratio to capital" is the ratio of the risk on the asset side (loans and securities), and is calculated using CET1 capital for internationally active banks from fiscal 2012 onward, core capital for domestic banks from fiscal 2013 onward, and Tier 1 capital for all others (excl. the transitional arrangements).
Source: BOJ.

Chart IV-3-5: Interest rate risk taking into account core deposits



Note: 1. Shows a 100 BPV as of end-March 2023. Covers all banks (excluding *shinkin* banks).
2. In the horizontal axis, "Shorter-term" refers to 3 months or less; "Short-term" refers to 3 years or less; "Medium-term" refers to 5 years or less; "Long-term" refers to 10 years or less; "Longer-term" refers to over 10 years.
Source: BOJ.

Chart IV-3-6: Distribution of the ratio of interest rate risk to capital



Note: 1. Shows the medians (markers) and 10th-90th percentile ranges (bands) of a 100 BPV as ratios to capital as of end-March 2023. Ratios to capital are calculated using Tier 1 capital for internationally active banks and core capital for domestic banks.
2. Covers all banks (excluding *shinkin* banks).
Source: BOJ.

2. The link between interest rate pass-through and interest rate risk

As noted above, the impact of changes in market interest rates is also determined by the interest rate pass-through to investment and funding products, in addition to the shape of the yield curve

⁴¹ The supervisory thresholds are 15 percent (relative to Tier 1 capital) for internationally active banks and 20 percent (relative to core capital) for domestic banks.

and banks' balance sheet structure. The interest rate pass-through is an important factor that determines the degree to which interest rate changes can turn into profits -- or give rise to losses. The following provides an overview of the impact of the interest rate pass-through on banks' profits through a simple simulation that assumes a change in the yield curve.

Two different yield curve scenarios are assumed: a steepening, in which the overnight rate is fixed at minus 0.1 percent, while 10-year and longer interest rates increase by 1 percentage point, and a parallel shift, in which the interest rate for all maturities increases by 1 percentage point. The yield curve is assumed to change only once at the beginning of the simulation period and be unchanged thereafter. In addition, for each yield curve scenario, two cases are assumed: one in which the interest rate pass-through to deposits is high (40 percent for demand deposits and 80 percent for time deposits), and one in which it is low (10 and 20 percent, respectively).^{42,43} Based on balance sheet information as of the end of fiscal 2022, by estimating the four different cases, the following examines how the degree of interest rate pass-through affects developments in banks' profits. While banks' on-balance positions -- their assets and liabilities as well as the residual maturity composition -- as well as their off-balance derivative positions may change in response to changes in the yield curve, it is assumed for the sake of simplicity that they do not change.

Banks' profits when the interest rate pass-through is high

The left panels of Chart IV-3-7 show the simulation results for net interest income when the interest rate pass-through to deposits is high (40 percent for demand deposits and 80 percent for time deposits). The upper left panel shows that when the yield curve steepens, the profits of both major banks and regional and *shinkin* banks increase over time. This is because, in the case of a steepening, in which short-term interest rates change little, the cost of deposits rises only modestly, while lending margins and margins on securities investment increase gradually as interest rates on assets change. A difference between major banks and regional and *shinkin* banks lies in the pace of the improvement in net interest income. Because of their longer asset duration, regional and *shinkin* banks' net interest income toward the end of the simulation period improves at a faster pace than that of major banks.

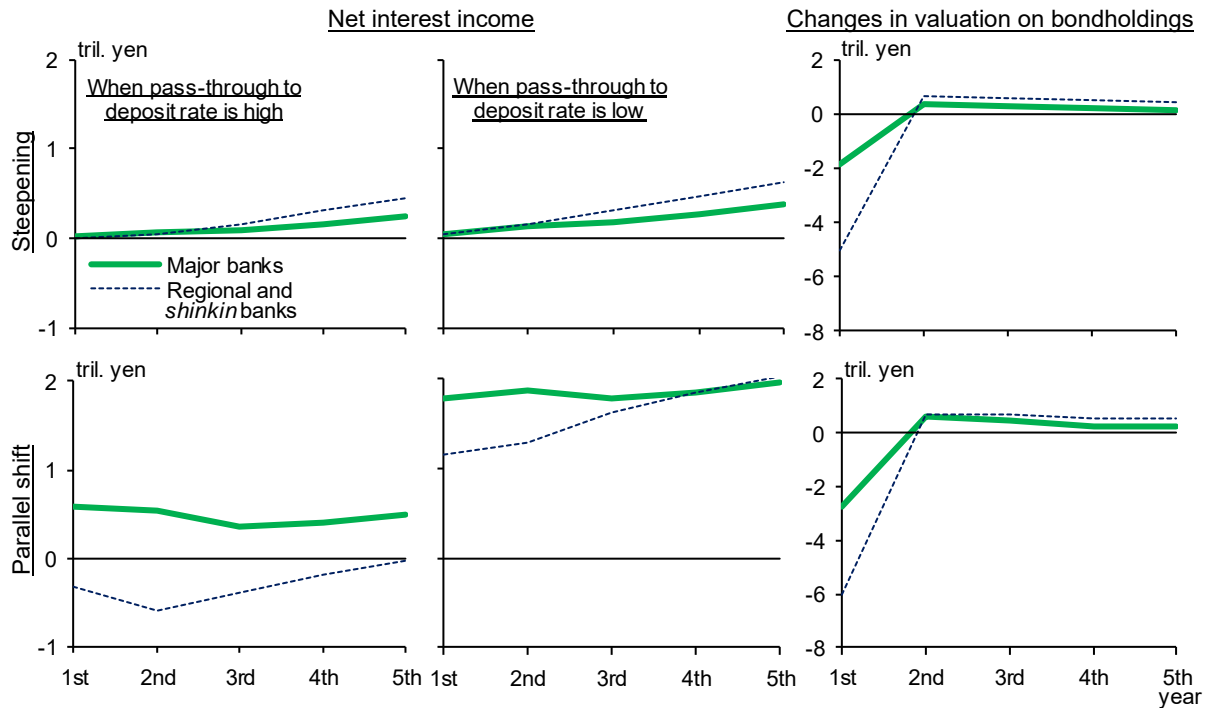
In the case of a parallel shift in the yield curve, the results for the net interest income of major banks and regional and *shinkin* banks differ completely, as in the lower left panel. While major banks' profits jump at the start of the simulation, those of regional and *shinkin* banks decline for some time. This difference is due to the impact of the hike in short-term interest rates. Major banks have a relatively small duration gap. In their lending, they have extended more floating-rate products, while in terms of their investment in securities, they have invested more in short-term bonds. Therefore, when short-term interest rates rise, major banks' investment yields increase more than the interest they pay on deposits. In contrast, regional and *shinkin* banks have a relatively large duration gap. They have tended to extend more long-term fixed-rate products in their lending, and invested more in long-term bonds in their investment in securities. Therefore, since the interest they pay on

⁴² The higher interest rate pass-through rates roughly correspond to the actual interest rate pass-through during the period of rising interest rates in 2006-2007. The lower interest rate pass-through rates roughly correspond to the actual interest rate pass-through for major U.S. banks in 2022. In the simulation, core deposits are treated as demand deposits with a duration of three months or less.

⁴³ Interest rate pass-through rates other than those for deposits are assumed to be as follows. The pass-through rate for loans linked to short-term prime rates is 50 percent, while that for all other loans (fixed-rate loans and loans linked to market rates) is 100 percent. That for securities and other marketable financial instruments is also 100 percent. In general, products linked to short-term prime interest rates are more susceptible to market interest rates. However, since 2009, the short-term prime rate has been flat at around 1.5 percent and no longer follows the market rate. For this reason, the interest rate pass-through to products linked to the short-term prime rate in the simulations in this section is assumed to be low.

deposits rises ahead of their investment yields, regional and *shinkin* banks continue to experience a deterioration in their net interest income.

Chart IV-3-7: Net interest income and changes in valuation on bondholdings



Note: "Net interest income" indicates the changes from the base period; "Changes in valuation on bondholdings" indicates the changes from the previous period.
Source: BOJ.

Banks' profits when the interest rate pass-through is low

The middle panels of Chart IV-3-7 show the simulation results for net interest income when the interest rate pass-through to deposits is low (10 percent for demand deposits and 20 percent for time deposits). As in the upper middle panel, the net interest income when the yield curve steepens is not very different from the case when the pass-through is high. It is assumed that short-term interest rates hardly rise and therefore the difference in the pass-through to deposit interest rates has no significant effect on lending margins and margins on securities investment. On the other hand, as seen in the lower middle panel, when there is a parallel shift in the yield curve, the net interest income of both major banks and regional and *shinkin* banks is much higher than in the case of a steepening yield curve. This is because the lower pass-through to deposit interest rates makes it easier to secure positive interest margins on both lending and securities investment. In particular, for regional and *shinkin* banks, net interest income is lower when the pass-through is high, while it is higher when the pass-through is low. Thus, even for the same change in the yield curve, the impact on net interest income can differ substantially depending on the pass-through to deposit interest rates.

Lastly, the right panels of Chart IV-3-7 show the simulation results for valuation changes in bondholdings. In the case of both a steepening and a parallel shift of the yield curve, valuation gains/losses on bondholdings deteriorate at the start of the simulation period, mainly due to the increase in long-term interest rates. The path of such valuation changes is not affected by the pass-through to deposit interest rates and more or less follows a similar trajectory for both major banks and regional and *shinkin* banks. Toward the end of the simulation period, the market value of the bonds that had deteriorated improves gradually as they approach maturity.

Implications for interest rate risk management

As seen above, the direct impact of interest rate fluctuations on the banking sector is determined by the interest rate pass-through to investment and funding products, in addition to the shape of the yield curve and banks' balance sheet structure. Japanese banks have the loss-absorbing capacity to cope with the interest rate risk they face. Nonetheless, they need to manage risk more prudently as the duration gap between assets and liabilities has become wider than in the past.

Several caveats regarding the analysis in this section should be noted. First, the simulations do not take into account any management actions by banks in response to rising interest rates. It is assumed that banks simply reinvest the redemption amount of their loans and bonds in line with the original maturity composition, and they do not adjust their positions using interest rate hedging or through loss-cutting. Therefore, the simulation results should not be interpreted as a projection of profits when interest rates rise, but rather as an illustration of the potential upward or downward pressure on profits.

Second, the simulations in this section are intended to depict the direct effects of interest rate changes and their transmission mechanisms, and indirect effects are outside the scope of the analysis. For example, while changes in the demand for funds due to changes in interest rates and the economic conditions may affect net interest income, they were not considered here. Moreover, while changes in banks' loan and deposit income lead to changes in the interest income and expenses (interest on deposits minus interest expenses) of the households and firms with which banks do business, which in turn affect the credit costs incurred by banks, such transmission mechanism is also not taken into account.

Third, the simulations here do not take heterogeneity in the interest rate pass-through across banks into account. To simplify the discussion, the pass-through was assumed to be identical across banks. In practice, however, the pass-through is a variable that banks can determine, and given the competitive environment in the lending and deposit markets, heterogeneity in the pass-through is likely to be fairly large. Moreover, deposits could shift across banks and products as a result of heterogeneity in pass-through rates -- for example, banks offering higher interest rates could see an increase in their deposits. When interest rates rise in practice, banks will have to decide on their own pass-through rates, taking such various events into account.

D. Funding liquidity risk

One of the factors that determines the stability of funding liquidity is sticky deposits. The larger the share of sticky deposits in banks' funding bases, the more stable their funding liquidity. Conversely, if the share of sticky deposits is low, as was the case with the U.S. banks that failed in March 2023, deposits can flow out in a short period of time. The following examines Japanese banks' yen and foreign currency funding liquidity risks from the perspective of the stickiness of deposits.

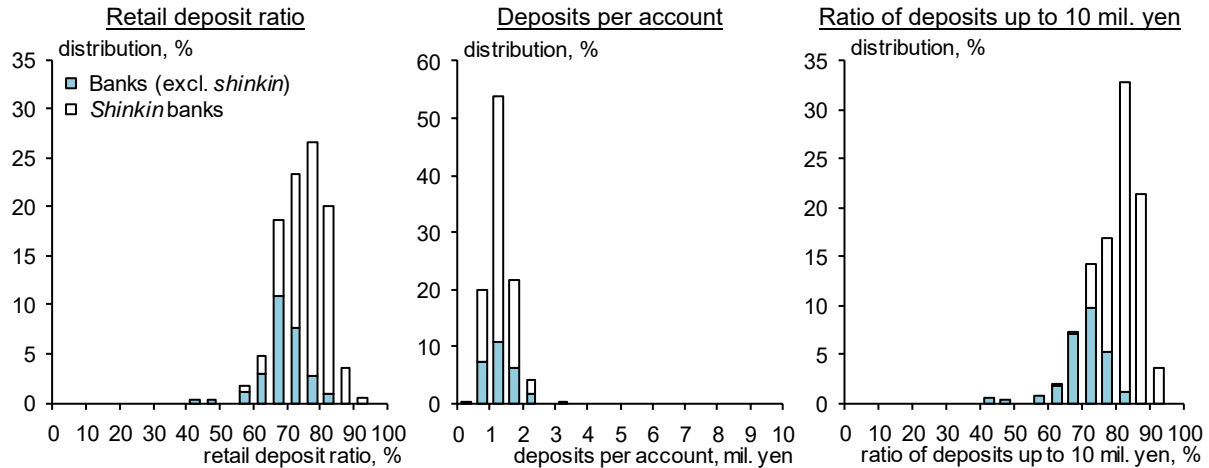
Stickiness of yen deposits

In terms of their yen funding, banks have ample liquidity. For depository financial institutions, the funding base for yen funding is small, sticky retail deposits (Chart IV-4-1). Most of these are insured deposits of up to 10 million yen.⁴⁴ Moreover, deposits outstanding far exceed loans outstanding.

⁴⁴ Under the deposit insurance system, general deposits up to 10 million yen per depositor as well as transaction account deposits are eligible for protection. Other deposits such as foreign currency deposits, negotiable certificates

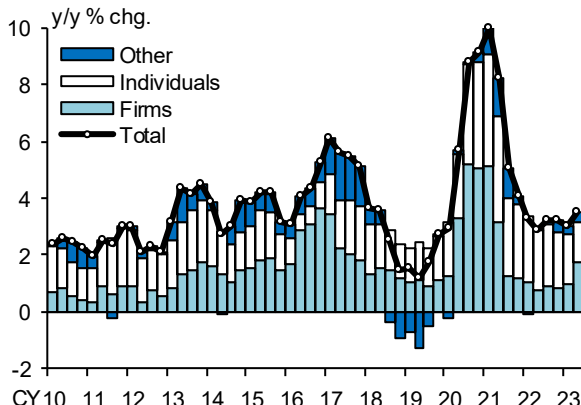
This stable funding base has enabled banks to secure yen funding at low interest rates. Looking at deposits outstanding by type of depositor, deposits from both individuals and firms have continued to grow (Chart IV-4-2).

Chart IV-4-1: Distribution of deposits



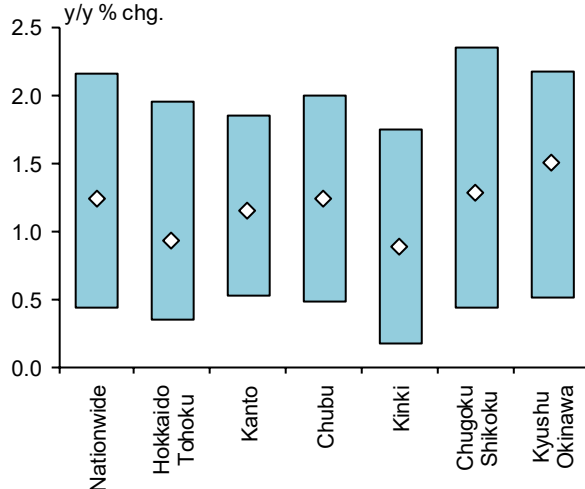
Note: 1. Shows the ratios to overall banks including major, regional, and *shinkin* banks on a bank group basis. Covers the accounts held by domestic branches. Financial institutions' deposits are excluded. Data as of end-March 2023.
 2. The right-hand chart shows the ratio of retail and corporate deposits (excl. current deposits) of 10 million yen or less.
 Source: BOJ.

Chart IV-4-2: Deposits outstanding by type of depositor



Note: Covers domestically licensed banks. Latest data as of the April-June quarter of 2023.
 Source: BOJ.

Chart IV-4-3: Distribution of deposits outstanding by region



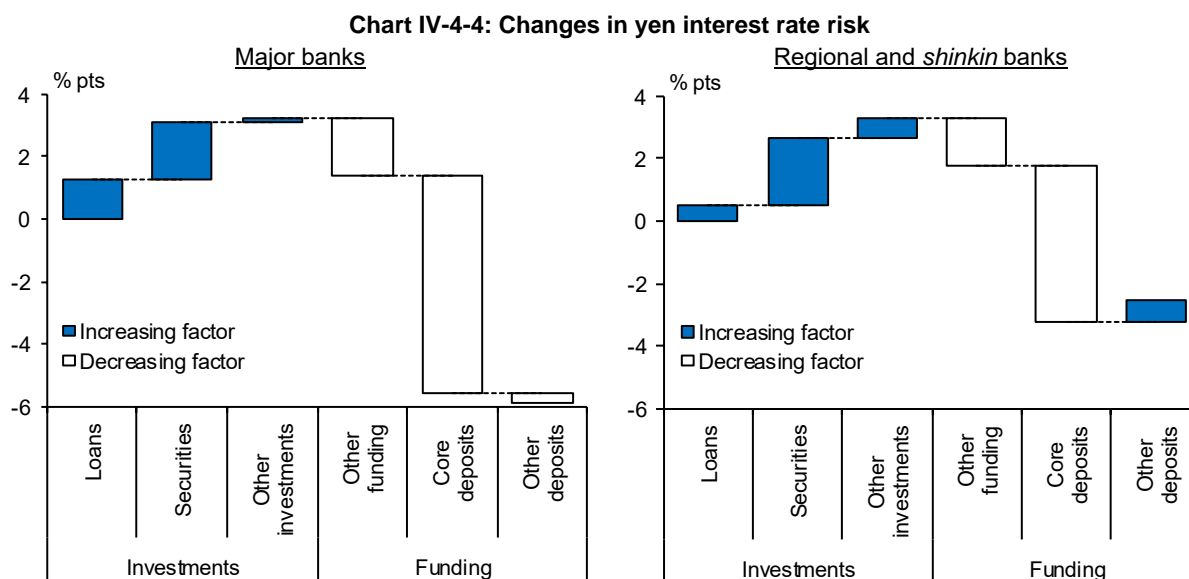
Note: Shows the medians (markers) and 25th-75th percentile ranges (bands) of year-on-year changes from fiscal 2021 to fiscal 2022 in the outstanding amount of retail and corporate deposits. Covers major, regional, *shinkin*, and other banks. Major and other banks are included only in "Nationwide."
 Source: BOJ.

However, there are some caveats regarding the outlook for the deposit market. First, the growth potential of the deposit market differs across regions (Chart IV-4-3). In fact, changes in deposits vary by region, reflecting differences in demographics and other factors. Even among banks based in the same region, there is heterogeneity in the growth in deposits. Banks therefore need to

of deposit, and bank debentures are not covered. The ratio of deposits up to 10 million yen in Chart IV-4-1 represents the estimated share of deposits of up to 10 million yen in those held by individuals and firms. It does not take into account transaction account deposits or deposits by the same holder in multiple accounts.

monitor closely aspects of their business environment that could affect their funding from deposits.

Second, as highlighted in previous issues of the *Report*, some banks regard the duration of corporate deposits, which increased as a result of pandemic-related loans, as equal to or greater than that of their loans. Going forward, as firms prepay or make scheduled repayments of pandemic-related loans, banks' corporate loans and deposits are both likely to decline. In that case, if there is a decline in their core deposits, which are regarded as having a longer duration than loans, some banks could see a widening in the duration gap between their assets and liabilities (Chart IV-4-4).



Note: 1. Shows changes from December 2019 to March 2023 in yen interest rate risk (a 100 BPV) in the banking book as ratio to capital.
2. Ratio to capital is calculated using CET1 capital for internationally active banks and core capital for domestic banks.
Source: BOJ.

Banks need to maintain a stable deposit base, taking these points into account. It should be noted that setting high interest rate premiums to attract deposits may not necessarily lead to the establishment of a stable deposit base. Rather, deposits with interest rate premiums may be more interest rate-sensitive and less sticky.

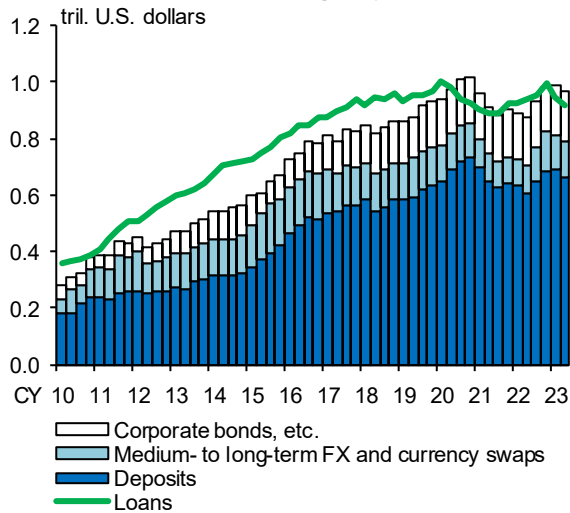
Stability of foreign currency funding

Banks have maintained stable foreign currency funding. 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-4-5). Since the start of this year, the growth in loans has leveled off (see Section A of Chapter III). On the other hand, funding has shifted to longer-term and more stable funding. Even as lending has started to decline, major banks have increased their long-term funding, such as through the issuance of corporate bonds.

Thus, major banks have remained conservative in their foreign currency funding. U.S. dollar funding markets, although calm at the moment, continue to be highly uncertain. In addition to the impact of successive policy rate hikes, the failures of U.S. banks in March 2023 have resulted in a substantial shift of funds from the deposit market to the MMF market (Chart IV-4-6). In particular, there has been a pronounced concentration of investment in safer government MMFs. In contrast, flows into prime MMFs, which are buyers of CDs and CP issued by financial institutions, have been limited.

Under these circumstances, issuance spreads on CDs and CP issued by major banks have remained high, as have those of foreign banks. In addition, the interest rate pass-through for major banks' dollar deposits is approaching the levels seen during the last time interest rates rose (Chart IV-4-7).

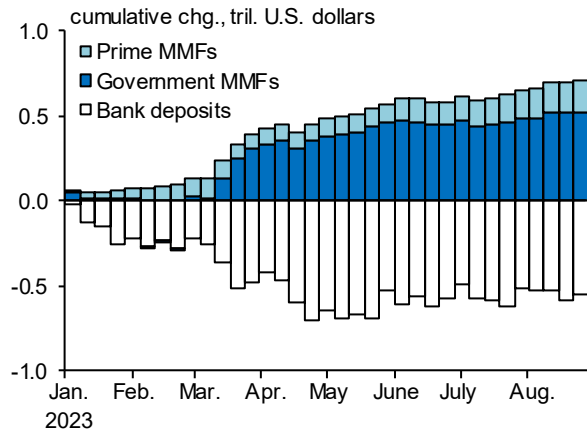
Chart IV-4-5: Loan-to-funding gap among major banks



Note: 1. "Corporate bonds, etc." and "Medium- to long-term FX and currency swaps" indicate funding maturing in over 1 year from end-June 2012 onward, with funding maturing in over 3 months prior to that time.
2. Covers internationally active banks. Latest data as of end-June 2023.

Source: BOJ.

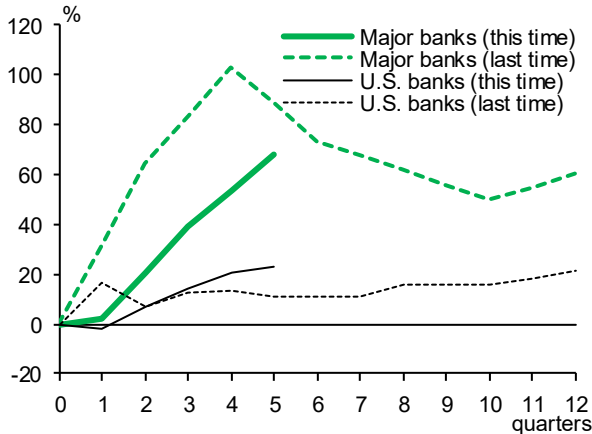
Chart IV-4-6: Net flows of MMFs



Note: Shows cumulative changes from end-December 2022. Latest data as of end-August 2023.

Source: FRB; Haver Analytics.

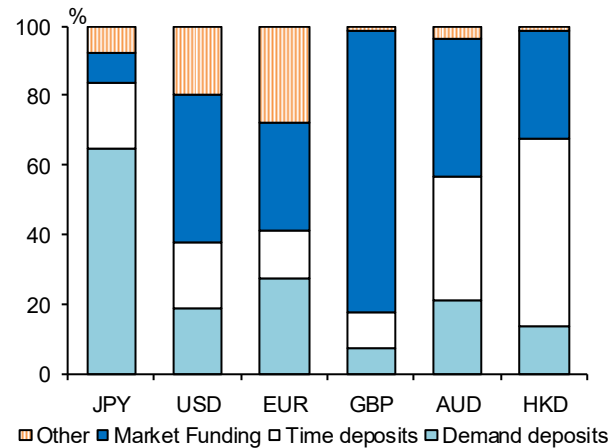
Chart IV-4-7: Pass-through to dollar deposit interest rates



Note: Shows the pass-through rates of the 3-month T-bill rate to deposit interest rates. "0" on the horizontal axis represents the July-September quarter of 2015 for "last time" and the October-December quarter of 2021 for "this time."

Source: BOJ.

Chart IV-4-8: Funding structure by currency



Note: Data as of end-March 2023. The chart covers major banks.

Source: BOJ.

Japanese banks, which are foreign banks in the United States, cannot directly access sticky retail deposits due to restrictions on their business operations. For this reason, they must use a combination of medium- and long-term market funding and the acquisition of transaction account deposits, which are highly sticky among corporate deposits. In fact, in their foreign currency funding, major banks rely more on market funding and corporate deposits than in their yen funding (Chart

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

IV-4-8). However, a number of caveats regarding the stability of these funding sources are in order. In the event of stress, the cost of market funding tends to rise more than that of deposits. Refinancing risk is also likely to increase if market liquidity, such as for FX swaps, declines.

Moreover, corporate deposits can vary in stickiness depending on the purpose of the deposit. Corporate time deposits are mainly for the purpose of earning interest. Therefore, when interest rates rise, such deposits might simply flow out to investment products with higher interest rates; this means that the switching costs for such deposits are low, and they are not very sticky. On the other hand, corporate demand deposits are transaction deposits for settlement between firms. Switching their transaction account would also mean switching their bank. Even when interest rates rise, the switching costs for such transaction deposits are high and such deposits are relatively sticky.

Banks need to secure a stable foreign currency funding base, taking the risk characteristics of individual funding sources into account. Major banks have so far established stable funding bases for dollar funding by combining several funding sources. Their efforts to increase the share of stable funding, including core deposits and long-term market funding, are continuing. With regard to funding from deposits, banks should continue to devise ways to increase the switching costs of deposits, such as by offering ancillary non-interest services such as transaction banking. Such higher switching costs are likely to help restrain funding costs.

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 services. At the same time, it also represents a new source of risks.⁴⁵ Of these risks, the following describes (1) financial risks associated with crypto-asset transactions, (2) financial risks accompanying the spread of digital technologies, and (3) the risk of cyberattacks.

Financial risks associated with crypto-asset transactions

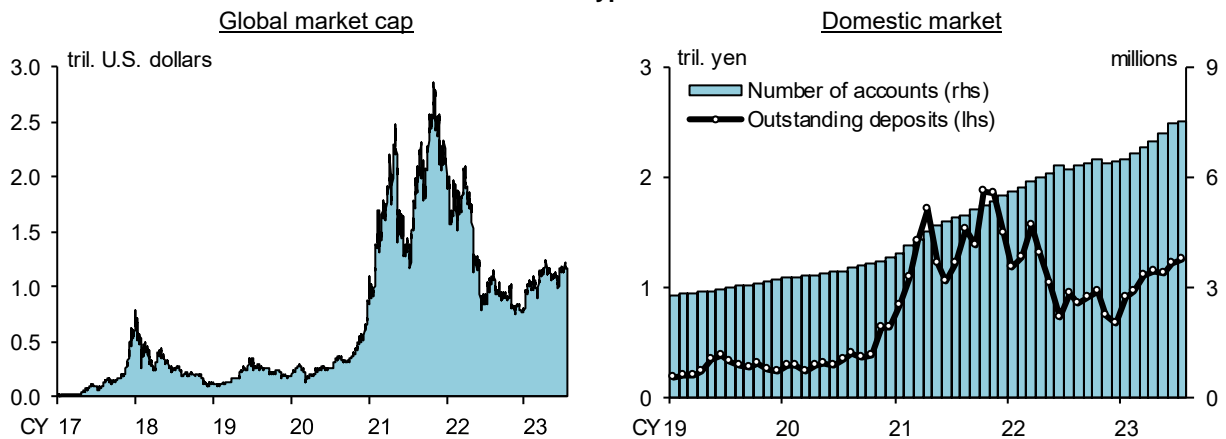
The characteristics of the financial risks pertaining to the services provided by crypto-assets and the underlying decentralized finance (DeFi) ecosystem are complex and systemic in nature. In this sense, the ecosystem and the traditional financial system have common financial risks. The presence of these financial risks was highlighted by the repricing in the crypto-asset market in 2022. To address the risks, financial authorities in Japan and abroad are accelerating efforts to formulate regulations and supervision for crypto-assets grounded in the principle of "same activity, same risk, same regulation." In July, the Financial Stability Board (FSB) formulated the following three documents on crypto-asset activities: (1) recommendations on crypto-asset activities and markets, (2) recommendations on global stablecoins, and (3) an umbrella public note that covers these two recommendations.⁴⁶

⁴⁵ 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.

⁴⁶ The first set of recommendations seeks to promote the consistency and comprehensiveness of regulatory, supervisory and oversight approaches to crypto-asset activities and markets, and to strengthen international cooperation, coordination and information sharing. The second is the revised recommendations on global stablecoins released in October 2020, which include the incorporation of recommendations into a wider variety of

The size of the crypto-asset market in Japan compared with those abroad is extremely limited. While securities companies have 180 trillion yen in individual assets under custody, the size of crypto-assets under custody at domestic exchanges is less than 1 percent of those assets (Chart IV-5-1). Moreover, the linkages between the crypto-asset market and the traditional financial system are weak in Japan. At present, financial risks associated with the crypto-asset market are contained. However, there has been an increase in the number of accounts, especially retail accounts. As crypto-assets and DeFi continue to develop, the market will keep growing and the risk characteristics of the market will continue to change. Identifying and appropriately addressing these changing risks will encourage sound innovation and contribute to the development of the overall financial system.

Chart IV-5-1: Crypto-asset markets



Note: Latest data as of July 2023.

Source: Coin Dance; Japan Virtual and Crypto assets Exchange Association.

Financial risks accompanying the spread of digital technologies

While the spread of digital technologies in financial services increases convenience, it also gives rise to some risks. For example, a series of runs at U.S. and European banks this March have shown that herding -- the speed and extent of the proliferation of credit concern -- through social media and online banking may be different from what occurred in the past. At the failed Silicon Valley Bank (SVB), social media and online banking accelerated the spread of information and deposit withdrawal, respectively, resulting in outflows of deposits equivalent to 20 trillion yen (80 percent of SVB's total deposits) in just two days.⁴⁷ This implies that it is necessary to take into account factors that are different from the past when discussing the stickiness and switching cost of deposits in the digital era.

In Japan, the rate of usage in online banking is not particularly high compared with other countries (Chart IV-5-2). In addition, Japanese banks' deposit base mainly consists of small, relatively sticky retail deposits. In many cases, there are daily usage limits for online fund transfers. These limits were originally introduced as anti-fraud measures, but they are also expected to contain the risk of deposit withdrawals within a short period of time. However, Japanese banks so far have not experienced a run on deposits since the spread of online banking and have not been tested in terms of whether such limits could prevent a run. Banks therefore should deepen their understanding of factors that determine deposit switching costs, taking the characteristics of their

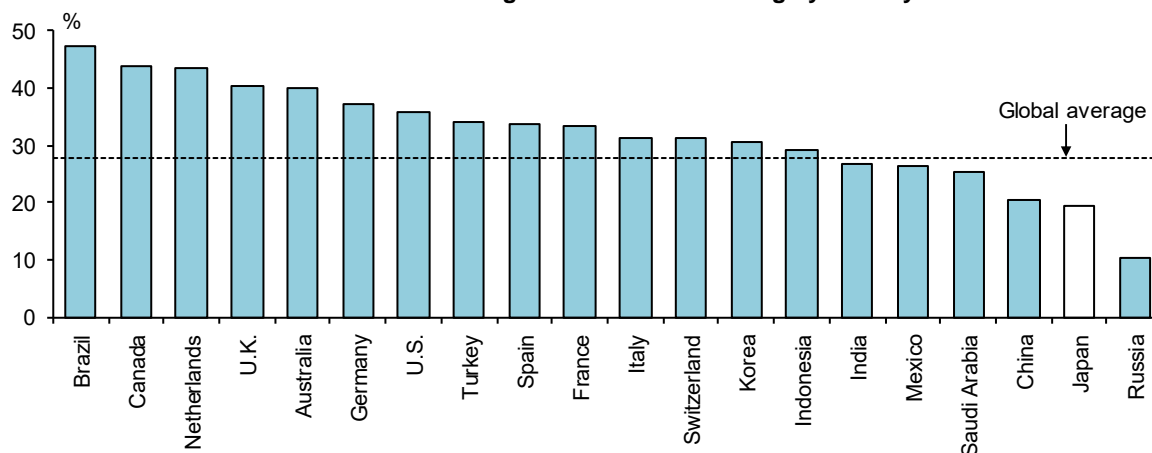
regulatory frameworks and strengthening of requirements related to stabilization mechanism and redemption rights. The third outlines the objectives of these two recommendations and presents the FSB's work plan going forward.

⁴⁷ For details, see Board of Governors of the Federal Reserve System, *Financial Stability Report*, May 2023.

IV. Risks faced by financial institutions
 E. Risks posed by changes in the business environment

deposit base -- such as the size of deposits, the level of concentration, coverage of deposit insurance, depositor profiles, and the purpose of deposits -- into account (see Box 2 for details on the stickiness of deposits).

Chart IV-5-2: Usage rate of online banking by country

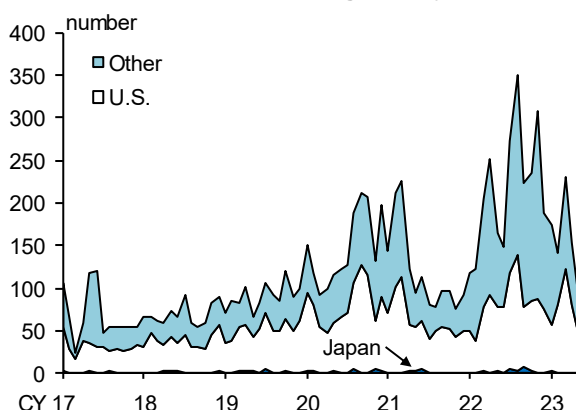


Note: Shows the ratios of online financial service users to internet users. Data as of 2022.
 Source: We Are Social & Meltwater (2023), "Digital 2023 Global Overview Report."

Risk of cyberattacks

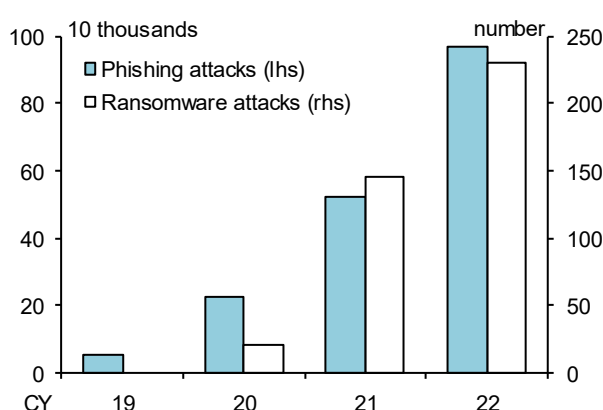
So far, the number of cyberattack cases confirmed in Japan has been minimal compared to the number of cases seen abroad (Chart IV-5-3). The systemic impact of these attacks has been limited. However, the number of phishing and ransomware attacks has increased considerably (Chart IV-5-4). Coupled with geopolitical issues such as Russia's invasion of Ukraine, the threat of cyberattacks remains elevated. Reflecting the spread of generative AI, a key characteristic of recent cyberattacks is the increase in phishing e-mails written in natural Japanese. Banks need to remain vigilant against cyber risks.

Chart IV-5-3: Number of global cyberattacks



Note: Latest data as of May 2023.
 Source: University of Maryland CISSM Cyber Attacks Database.

Chart IV-5-4: Number of attacks in Japan



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

Banks need to continue to enhance their cyber resilience while referring to the basic elements of security measures.⁴⁸ Even if cyberattacks cannot be blocked completely, what is important is to

⁴⁸ The basic elements of security measures consist of (1) "identification" of information assets to be protected, (2) "prevention" against cyberattacks, (3) "detection" of threats, (4) "response" after threats are detected, and (5) "recovery" of affected functions.

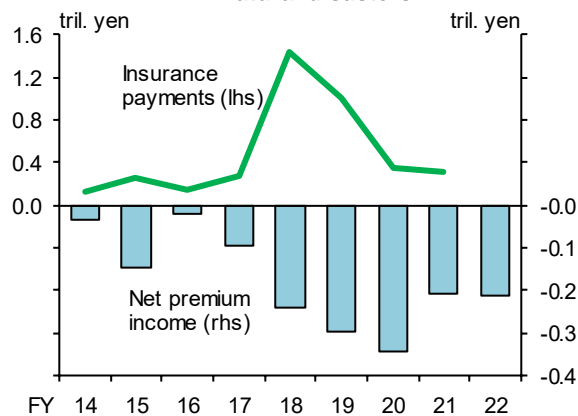
limit the potential damage as much as possible by reducing the risk of information leakage and avoiding the suspension of critical business operations. In addition to traditional frontline defense measures, it is becoming increasingly important to take multi-layered cybersecurity measures that assume the intrusion of threats. In contrast to traditional frontline measures based on the premise that the inside of the network is safe and that the outside is dangerous, a security measure called Endpoint Detection and Response (EDR), which is based on the "zero-trust" approach that the inside of a network is not necessarily secure, has come into widespread use. Assuming that unknown malware could infiltrate a network, it is important to detect suspicious behavior within the network that would not normally occur and then take prompt action.

The Bank of Japan will encourage banks to improve their cyber resilience while taking these latest measures into account. As in the previous fiscal year, the Bank, in cooperation with the Financial Services Agency, will examine the status of major banks' cybersecurity management frameworks. It will also implement a self-assessment survey on regional and *shinkin* banks' cybersecurity management frameworks.

2. Climate-related financial risks

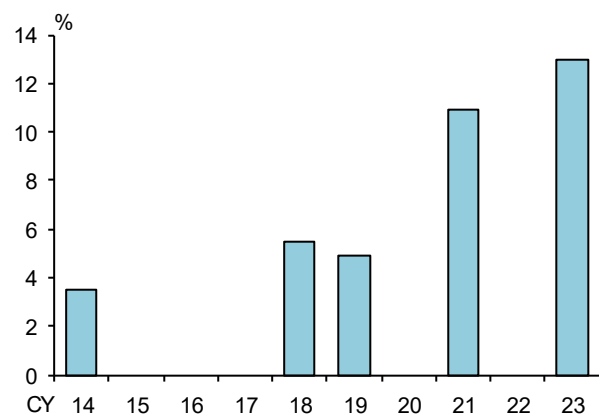
Climate change can threaten the stability of the financial system through climate-related financial risks -- i.e., physical and transition risks. As for physical risks, the damage from extreme weather events has become more extensive in recent years. In Japan, annual insurance payments for natural disasters, mostly for wind and flood damage, have totaled more than 1 trillion yen (Chart IV-5-5). As a result of the increase in insurance payments, the net premium income of insurers has deteriorated. Against this background, the basis for the calculation of insurance premiums for insurers (reference loss cost rates) was raised significantly four times from 2018 (Chart IV-5-6). Moreover, in 2021, the maximum insurance coverage period was shortened from 10 years to 5 years.

Chart IV-5-5: Insurance payments for natural disasters



Note: "Net premium income" covers the fire insurance of the four major general insurance companies.
 Source: General Insurance Rating Organization of Japan; Published accounts of each company.

Chart IV-5-6: Revision of reference loss cost rates



Note: Average revision rates of fire insurance (homeowners' comprehensive insurance).
 Source: General Insurance Rating Organization of Japan.

Due to its very nature, measuring climate-related financial risks is not easy. The risk of natural disasters, which have become increasingly severe in recent years, is reflected only to a limited extent in past data. Risk indicators and risk measurement models based on these past data therefore may underestimate climate-related financial risks. There is high uncertainty over the impact of physical and transition risks on the financial system, and this also makes risk

IV. Risks faced by financial institutions

E. Risks posed by changes in the business environment

measurement difficult. In addition, in measuring climate-related financial risks, firm-level disclosures are essential since they provide the underlying information for the measurement of such risks.

Efforts toward addressing climate-related financial risks are underway, in line with the FSB Roadmap for Addressing Climate-related Financial Risks. The annual report released in July 2023 confirmed progress made in the areas of firm-level disclosures, data, vulnerabilities analysis, and regulatory and supervisory practices and tools. In the area of disclosures, the International Sustainability Standards Board (ISSB) finalized standards for climate-related disclosures and general sustainability-related disclosures in June 2023, with a view to improving the comparability and consistency of disclosed information. The Basel Committee on Banking Supervision (BCBS), in order to ensure the stability of the financial system, plans to publish a consultation document on disclosure standards for banks' climate-related financial risks by the end of 2023. Moreover, in individual jurisdictions, there have been ongoing deliberations on their own disclosure standards.

In Japan, the Sustainability Standards Board of Japan (SSBJ) aims to finalize domestic disclosure standards by the end of fiscal 2024 based on the aforementioned standards set by the ISSB. Moreover, in the run-up to discussions by the ISSB, a Cabinet Office order has made it mandatory for firms to disclose sustainability-related initiatives in their annual securities reports, starting with financial results for the fiscal year ending in March 2023. The Cabinet Office order requires listed firms to disclose the four core elements -- governance, strategy, risk management, and metrics and targets -- in line with the recommendations of the Task Force on Climate-related Financial Disclosures (TCFD).

With regard to greenhouse gas emissions, financial institutions have made progress in disclosing the timing of achieving reduction targets and their actual reductions of Scope 1 emissions (direct emissions of a firm itself) and Scope 2 emissions (indirect emissions from the use of energy supplied by other firms) (Chart IV-5-7). Meanwhile, Scope 3 emissions (emissions by other firms

Chart IV-5-7: Disclosure based on TCFD recommendations

number of companies

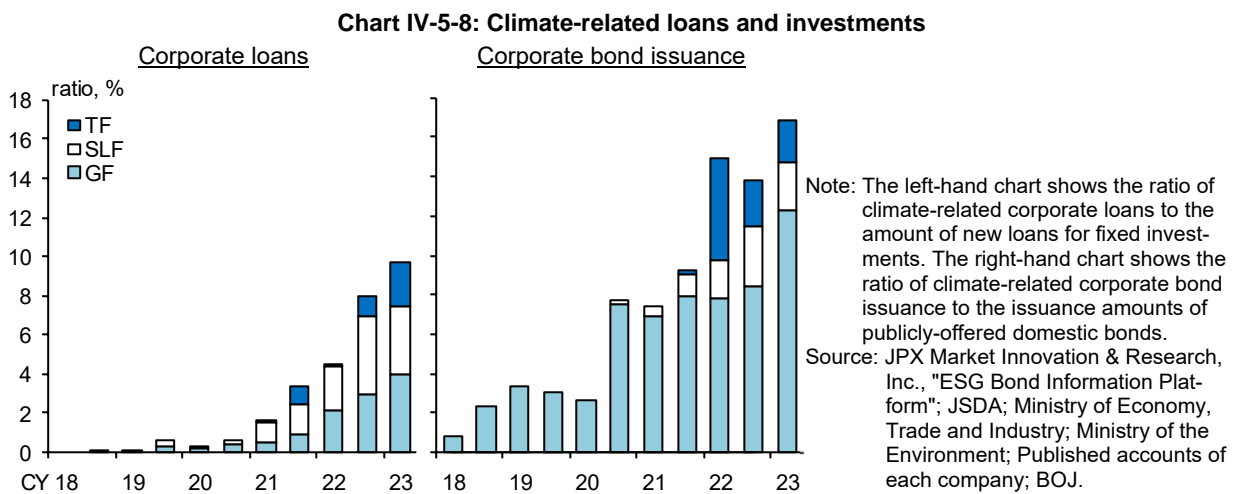
				Major banks	Regional banks	Other financial institutions
Governance				6	74	40
Strategy	Carbon-related exposure			6	57	2
	Scenario analysis			6	57	21
		Quantitative analysis		6	51	11
Risk management	Investment and lending policies			6	63	8
	Identification of top risks			6	12	7
Metrics and targets	Investment and lending	Target amount		6	58	4
		Actual amount		6	51	6
	Reduction of greenhouse gas emissions	Scope 1, 2	Net zero target period	6	46	13
			Actual amount	6	68	23
		Scope 3	Net zero target period	6	7	10
			Target amount by industry	5	1	1
Actual amount by industry	6	17	2			

Note: Covers 6 major banks, 74 regional banks, 37 securities and commodity futures trading companies, and 8 insurance companies in the financial industry listed on the Tokyo Stock Exchange's Prime and Standard Markets.

Source: Published accounts of each company.

related to the firm's own activities) are disclosed only by some financial institutions, partly due to the difficulty of measurement. The industry-level disclosure is limited to emissions of high-emitting sectors. The number of firms disclosing industry-level reduction targets is also limited.

To support the transition to decarbonization on the financial front, banks are expected to provide (1) green finance (GF), i.e., financing for projects that contribute to decarbonization, (2) sustainability-linked finance (SLF), i.e., financing for entities that are engaged in initiatives that contribute to decarbonization, and (3) transition finance (TF), i.e., financing where the use of funds and the initiatives of entities contribute to step-by-step decarbonization. The importance of transition finance was reconfirmed at the G7 Hiroshima Summit held in May this year. In Japan, relevant ministries and agencies, in cooperation with the private sector, have discussed how to measure and disclose financed emissions -- the amount of greenhouse gas emissions of firms that banks lend to or invest in -- as well as the methods and timing of international communication. In addition, climate-related markets are growing steadily, particularly for green finance (Chart IV-5-8).



With regard to addressing climate change issues related to the financial system, the Bank will also push ahead with various measures. On the financial front, the Bank will 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 based on recommendations, such as by the TCFD, 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.

V. Resilience of the financial system

- With regard to loss-absorbing capacity, banks' capital exceeds regulatory requirements. Their profitability has been on an improving trend, although it remains low. Loan-loss provision ratios have been relatively high. However, room for realizing gains on securities holdings has declined at many banks. It is important for banks to ensure loss-absorbing capacity that is commensurate with macro-economic and financial conditions as well as their business models.
- Given banks' loss-absorbing capacity, macro stress testing is conducted under two downside scenarios: a "financial stress scenario," which assumes stress similar to the global financial crisis, and an "inverted yield curve scenario," which assumes that foreign yield curves become and stay substantially inverted. By considering the same scenarios used in previous issues of the *Report*, this section revisits issues that should be examined with regard to the risk of inverted foreign yield curves remaining higher for longer.
- 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. It should be noted that banks' loss-absorbing capacity could change to some degree depending on the interest rate pass-through to foreign currency deposit funding. If interest rates stay higher for longer, borrower firms' financial conditions could deteriorate non-linearly.

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

Capital

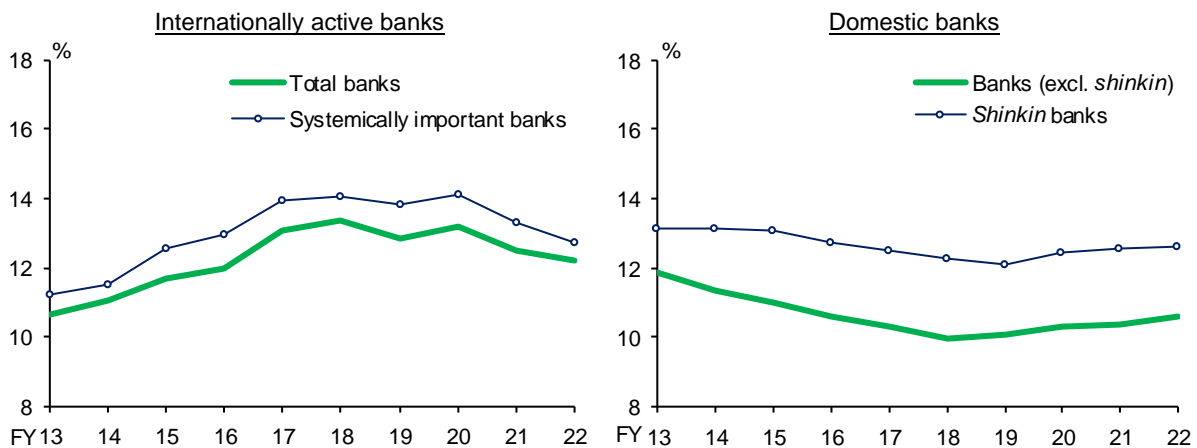
Banks have maintained sufficient capital. Both the common equity Tier 1 (CET1) capital ratio of internationally active banks and the core capital ratio of domestic banks substantially exceeded the regulatory requirements at the end of fiscal 2022 (Chart V-1-1).⁴⁹ Banks have sufficient capital bases overall, which will enable them to continue with risk-taking. Some regional banks adopted the finalized Basel III regulations early, from the end of March 2023. The latest capital adequacy ratios of these banks have improved by a little over 1 percentage point, mainly due to a decline in risk-weighted assets among corporate exposures.

For the remaining banks, the application of the finalized Basel III regulations will start from end-March 2024 for internationally active banks and domestic banks that use the internal models approach, and from end-March 2025 for domestic banks that use the standardized approach. The finalized package of capital adequacy ratio regulations covers a wide range of fields, including

⁴⁹ 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 for global systemically important banks (G-SIBs) of 1 to 2.5 percent or domestic systemically important banks (D-SIBs) of 0.5 percent.

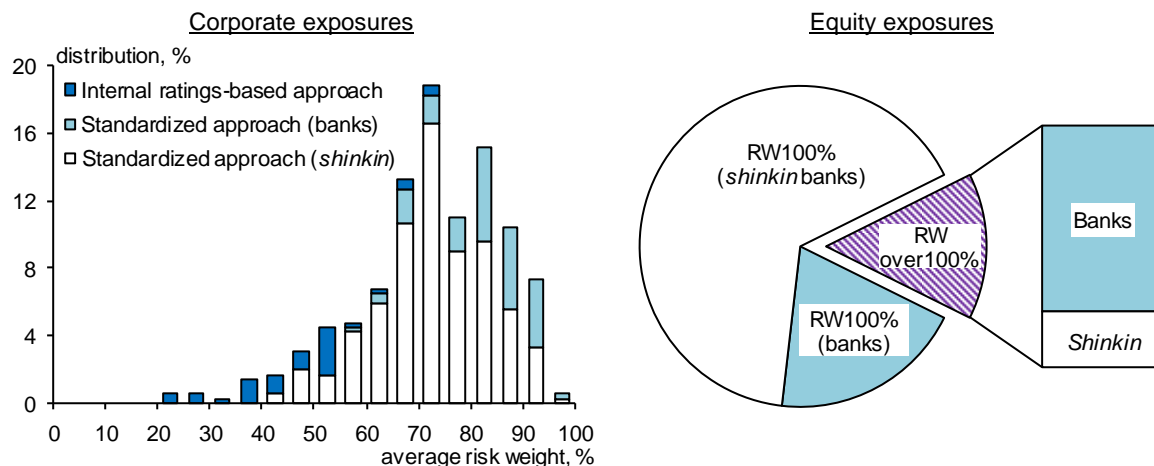
revisions to (1) the standardized approach for credit risk, (2) the internal ratings-based approach for credit risk, (3) the market risk framework, (4) the credit valuation adjustment risk framework, and (5) the operational risk framework, in addition to (6) the introduction of an output floor. Of these, revisions associated with credit risk are likely to have the most significant impact, as compared to the current risk measurement (Chart V-1-2). The decline in the risk weight for corporate exposures pushes up capital adequacy ratios.⁵⁰ On the other hand, the introduction of the output floor and the increase in the risk weight for stockholdings will lower the capital adequacy ratios.⁵¹ 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.

Chart V-1-1: Capital adequacy ratios



Note: The left-hand chart shows the CET1 capital ratio of internationally active banks; the right-hand chart shows the core capital ratio of domestic banks. In principle, on a bank group basis. The transitional arrangements are taken into consideration. Source: Published accounts of each company; BOJ.

Chart V-1-2: Distribution of risk weight of credit risks



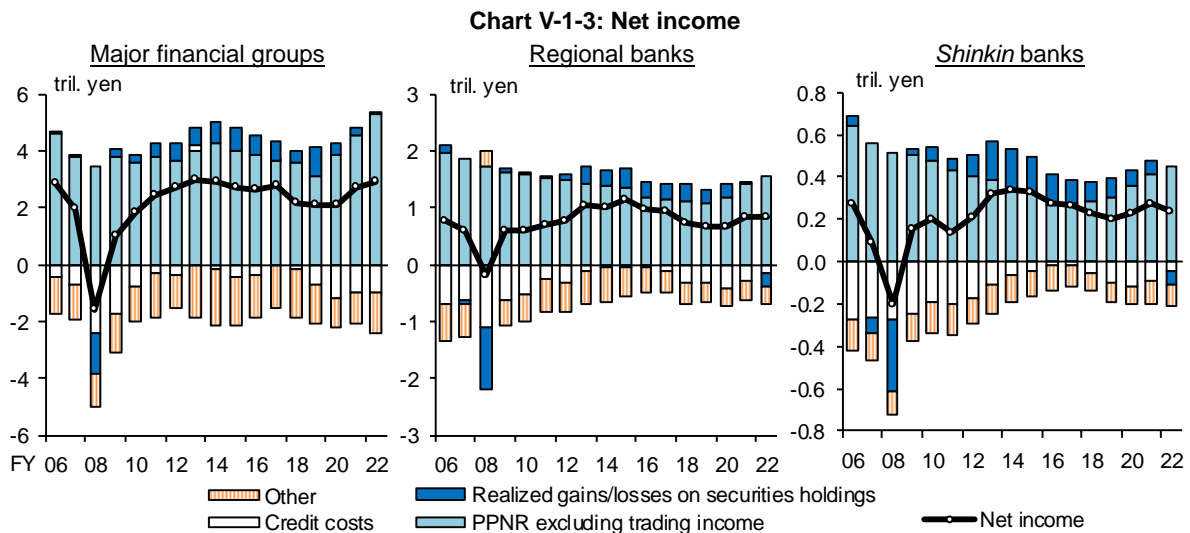
Note: The left-hand chart shows the distribution of banks by type of credit risk measurement method. In the right-hand chart, average risk weight (RW) does not cover equity investments in funds. Data as of end-March 2023. Source: BOJ.

⁵⁰ In addition, the abolition of a multiplier (scaling factor) that applies to risk-weighted assets and the decline in loss given default push up the capital adequacy ratios of banks that use the internal models.

⁵¹ The output floor sets a lower limit to the amount of capital benefit a bank can obtain from using internal models, so that banks' calculations of risk-weighted assets based on internal models do not fall substantially below those calculated based on the standardized approach. The output floor will be gradually increased from the initial 50 percent to 72.5 percent of the risk-weighted assets based on the standardized approach.

Profit buffers

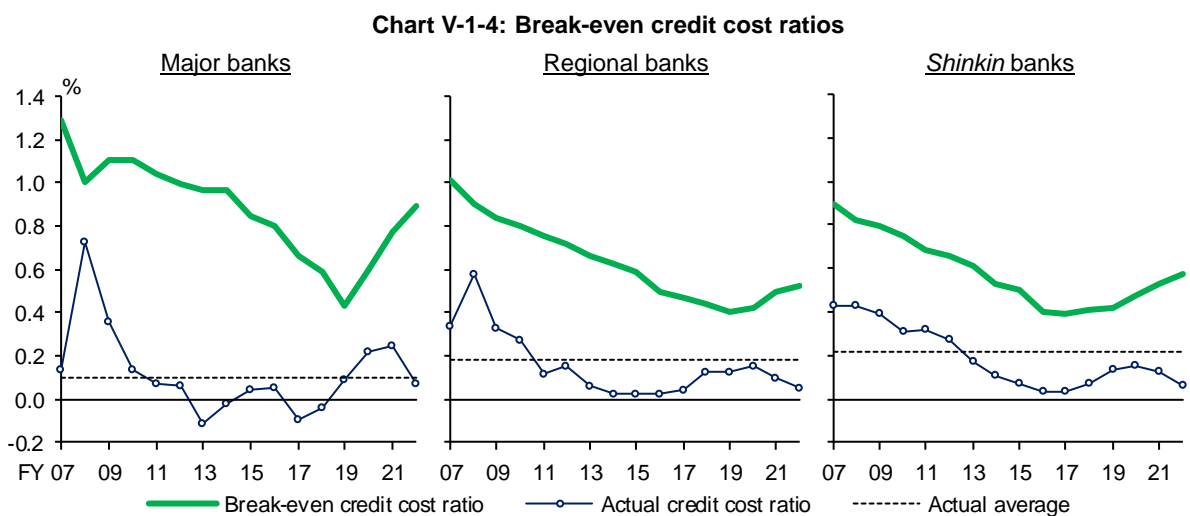
Looking at banks' net income for fiscal 2022, realized gains/losses on securities holdings turned negative at regional and *shinkin* banks due to loss-cutting on bondholdings (Chart V-1-3).⁵² Nevertheless, pre-provision net revenue (PPNR) excluding trading income has continued to improve for all types of banks. It has been pushed up by the reduction in overhead costs in the domestic business sector as well as the increase in domestic and foreign loans outstanding and the improvement in foreign lending-deposit margins.



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, Sumitomo Mitsui Financial Group, Resona Holdings, Sumitomo Mitsui Trust Holdings, SBI Shinsei Bank, and Aozora Bank. The data are adjusted for special items.

Source: Published accounts of each bank; BOJ.

On the back of the improvement in PPNR excluding trading income, break-even credit cost ratios (PPNR excluding trading income/loans outstanding) also have been improving (Chart V-1-4). The break-even credit cost ratio represents credit costs that can be absorbed by PPNR excluding



Note: "Break-even credit cost ratio" is the ratio at which credit costs equal PPNR excluding trading income, which from fiscal 2012 onward excludes profits and losses from investment trusts due to cancellations. "Actual average" is the average of actual credit cost ratios from fiscal 2005 to the latest year.

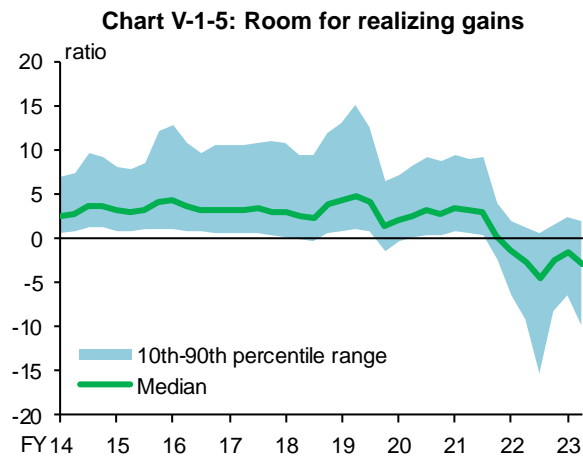
Source: BOJ.

⁵² For details on banks' financial results for fiscal 2022, see "Financial Results of Japan's Banks for Fiscal 2022," *Financial System Report Annex Series*, September 2023.

trading income in a single fiscal year, relative to loans outstanding. The higher the ratio, the greater banks' capacity to absorb losses. While the capital adequacy ratio represents banks' loss-absorbing capacity on a stock basis, the break-even credit cost ratio captures their short-term loss-absorbing capacity on a flow basis (i.e., on the basis of their profits). For all types of banks, the break-even credit cost ratios are well above their past averages of actual credit cost ratios.

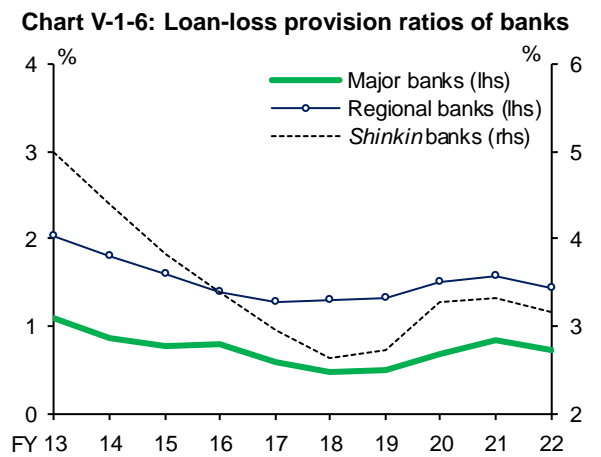
Room for realizing gains

Valuation gains/losses on securities holdings, which are not included in the regulatory capital for domestic banks, can function as a capital buffer on an economic value basis. In fact, some banks have secured net income by realizing gains on securities when they incurred losses such as credit costs. As seen in Section B of Chapter IV, the increase in banks' valuation losses has been limited compared to the start of this year, partly because they have further rebalanced their portfolios. However, the "room for realizing gains" -- defined as net 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 been at a low level due to the rise in interest rates (Chart V-1-5). It has remained negative for more than half of regional and *shinkin* banks.



Note: 1. Room for realizing gains = valuation gains/losses on securities holdings / PPNR excl. trading income and profits/losses on fund cancellations (3-year backward moving averages).
 2. The latest data are calculated with valuation gains/losses as of end-August 2023 and PPNR excl. trading income as of fiscal 2022. The chart covers major, regional, and *shinkin* banks.

Source: BOJ.



Note: Loan-loss provisions are compared to unsecured loan amounts.

Source: BOJ.

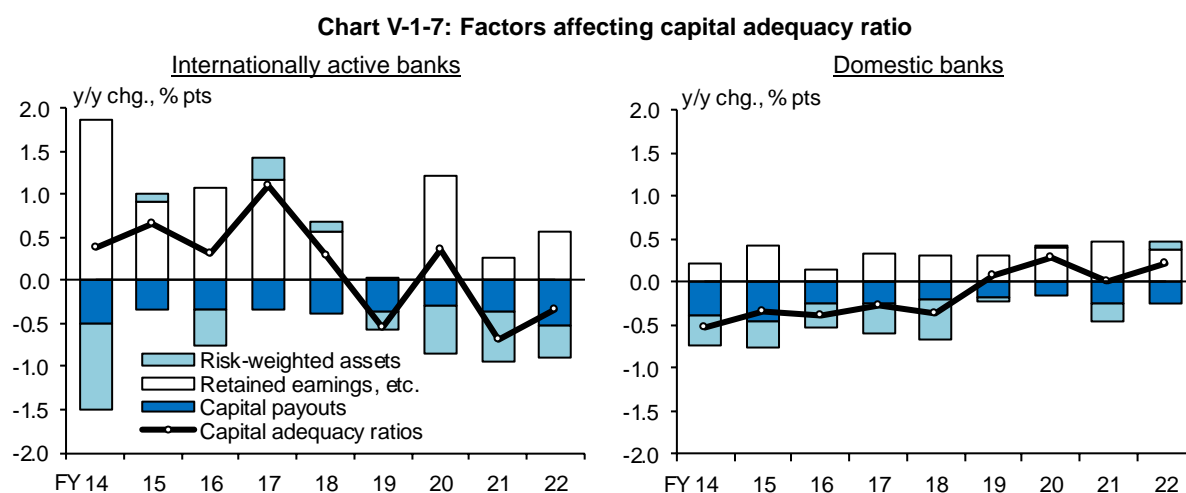
To summarize loss-absorbing capacity, banks' capital exceeds regulatory requirements and their profit buffers have improved. Banks have also managed to curtail the risk of additional valuation losses on securities holdings. This is especially the case for banks that have been rebalancing their portfolios. Loan-loss provision ratios for unsecured loans have been relatively high in the past few years (Chart V-1-6). However, attention should continue to be paid to the fact that room for realizing gains on securities holdings, which can be used to offset losses in a relatively flexible manner, has declined for many banks.

2. Capital policies based on capital bases and profitability

To perform financial intermediation activities in a sustainable manner, banks need to maintain sufficient capital bases and at the same time secure stable profitability. To this end, it is essential

for banks to achieve a virtuous cycle in which they accumulate retained earnings by securing a certain level of profits and use such earnings to provide high-quality financial services. With this virtuous cycle, banks will be able to provide financial services in a sustainable and stable manner.

In terms of the sufficiency of capital, banks have sufficient capital, as mentioned earlier. However, this does not necessarily guarantee that they will continue to have sufficient capital into the future. As with the case of the European bank failure in March 2023, even if banks have sufficient regulatory capital, they may not be able to continue operations if there are doubts about the outlook for their core profitability. As highlighted in the previous issue of the *Report*, even banks with low loss-absorbing capacity have been making payouts at more or less the same levels as other banks.⁵³ As a result, a certain level of capital payouts has continued at banks as a whole, regardless of changes in their profits before dividends and the increase in risk-weighted assets (Chart V-1-7). The distribution of profits in banks' capital policies -- whether profits are paid out to shareholders or retained as internal reserves -- should be based on their capital bases and profitability.



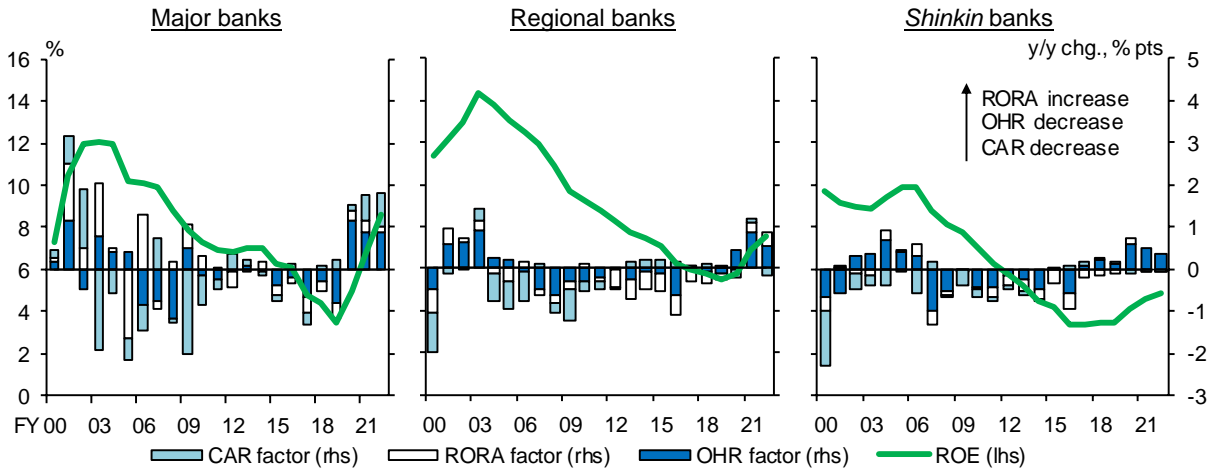
Note: The left-hand chart shows the CET1 capital ratio of internationally active banks; the right-hand chart shows the core capital ratio of domestic banks. In principle, on a bank group basis. The transitional arrangements are taken into consideration. Source: Nikkei Inc., "NEEDS-Financial QUEST"; BOJ.

In terms of capital efficiency, banks' profitability had long been on a downtrend. Although banks' return on equity (ROE) based on PPNR excluding trading income has recently started to increase, this is mainly due to improvements in the OHR factor, which represents banks' operating efficiency, and CAR factor, which represents their capital adequacy ratios (Chart V-1-8).⁵⁴ Regional banks' RORA factor, which shows their investment efficiency, has been at a historically low level, thus hindering improvement in their ROE (Chart V-1-9). If the improvement in banks' core profitability and capital accumulation were to stall, financial intermediation could be impaired due to a decline in banks' loss-absorbing capacity. Moreover, vulnerabilities in the financial system could increase through excessive search for yield. Amid such risks of an overheating or contraction in banks' activities, it is important for banks to establish stable profitability.

⁵³ Even banks with low loss-absorbing capacity have raised their dividend payout ratios. As a result, no significant difference can be observed in the total payout ratios of individual banks regardless of their capital levels. For details on the relationship between banks' total payout ratios and loss-absorbing capacity, see Section A of Chapter V in the April 2023 issue of the *Report*.

⁵⁴ 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 income), and (3) the CAR factor (the inverse of the capital adequacy ratio).

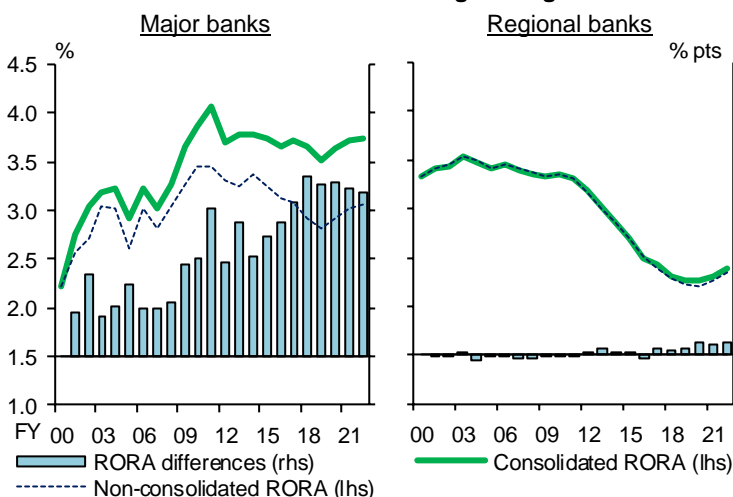
Chart V-1-8: ROE based on PPNR excluding trading income



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

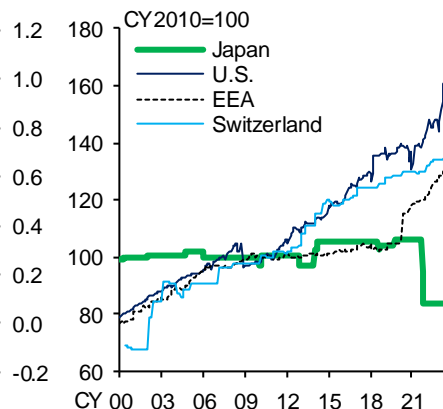
Regional banks are beginning to show the results of their efforts to improve profitability. Regional banks' RORA on a consolidated basis is now higher than on a non-consolidated basis, although not to the same extent as for major banks. Since 2020, there has been a growing trend among regional banks to establish bank holding companies and then establish new group companies under their umbrella. These group companies offer consulting services, such as services aimed at revitalizing regional economies, digitalization support, and introduction of staff. However, while foreign banks have been steadily raising the prices of the financial services they offer, partly reflecting the rise in general price level, financial service prices in Japan have remained flat for a long time (Chart V-1-10).⁵⁵ Banks should improve their profitability by expanding their services to meet customers' diverse needs for financial transactions and by setting rates that are proportionate to such services.

Chart V-1-9: RORA based on gross operating profits from core business excluding trading income



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

Chart V-1-10: Price indices for financial services



Note: CPI basis. "EEA" refers to the European Economic Area member countries. Latest data as of June 2023.
Source: Haver Analytics; Ministry of Internal Affairs and Communications.

⁵⁵ In Chart V-1-10, the large drop in the index for Japan in October 2021 reflects the reduction in bank transfer fees.

B. Macro stress testing

This section comprehensively examines the stability of the financial system using macro stress testing. Macro stress testing aims to dynamically examine the resilience of the financial system and the impact on financial intermediation under specific hypothetical stress events.^{56,57}

As in previous issues of the *Report*, the stress testing assumes two downside scenarios: a "financial stress scenario" and an "inverted yield curve scenario." The "financial stress scenario" assumes acute stress, such as the global financial crisis, and has been examined regularly. The "inverted yield curve scenario" is used to examine the impact of the global tightening of financial conditions. In the United States and Europe, there has been talk that policy rates could remain higher for longer to address sticky inflationary pressures. This would likely affect Japan's financial system through direct and indirect channels, such as higher investment yields and funding rates, larger valuation losses on securities holdings, and the materialization of credit risk on borrower firms. In such instance, the interest rate pass-through to deposit funding could increase depending on the structure of the deposit market and supply-demand conditions for funds.

These downside scenarios are hypothetical and designed to effectively examine the resilience of the financial system. They represent neither the Bank's outlook for the future economic and financial environment, asset prices, and policy conduct nor the likelihood of the outcome.

1. Baseline scenario

The baseline scenario assumes that Japan's economy recovers as foreign economies continue to recover moderately, based on average forecasts by several research institutions and market expectations as of July 2023.⁵⁸ 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. Specifically, the baseline scenario assumes that long-term domestic interest rates rise slightly in line with the rates implied by the average forward rate curve of the past one year. It is assumed that long-term foreign interest rates are unchanged, in line with the forward rate curve in July 2023, and that other financial variables (stock prices, crude oil prices, exchange rates, and various credit spreads) are unchanged from their levels in July 2023. 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*. As a result of intermittent policy rate hikes abroad, short-term foreign interest rates are about 1 percentage point higher.

The simulation results indicate that capital adequacy ratios at the end of fiscal 2025 -- the end of the simulation period -- are sufficiently above the regulatory requirements for all types of banks (Chart V-2-1). For internationally active banks, valuation gains/losses on securities holdings, which pushed down their capital adequacy ratio in the simulation of the previous *Report*, push up the ratio

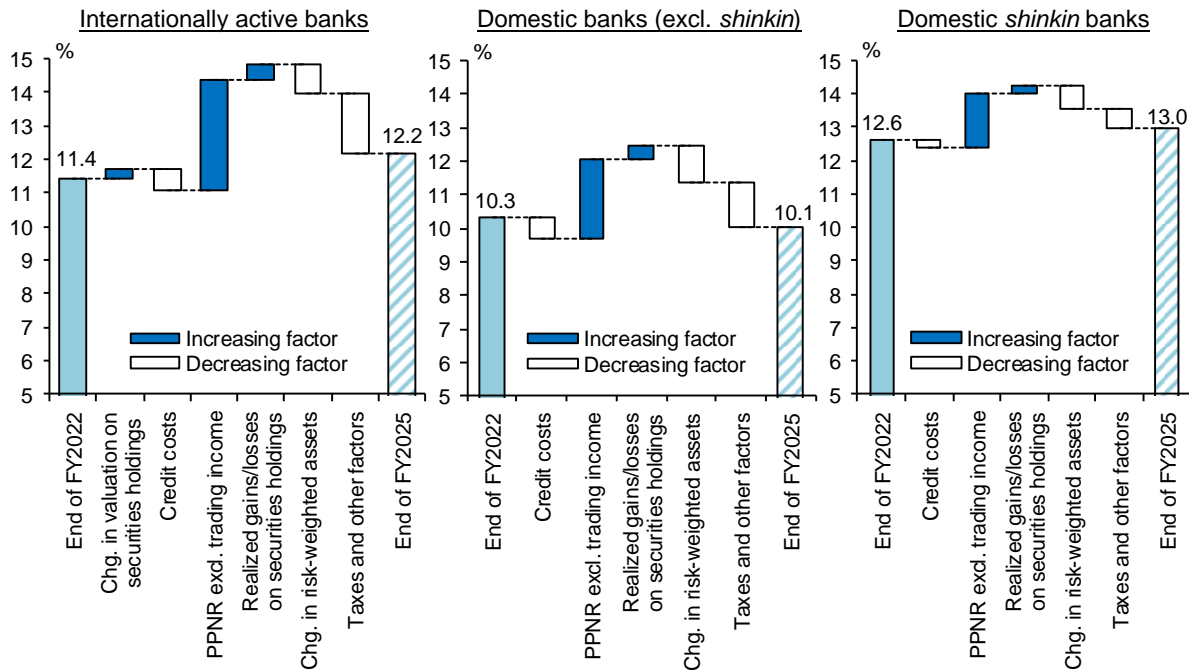
⁵⁶ The simulation utilizes the Financial Macro-econometric Model (FMM) developed by the Financial System and Bank Examination Department of the Bank. For the basic structure of the model, see Abe, N., Chikamatsu, K., Kanai, K., Kawasumi, Y., Munakata, K., Nakayama, K., Okuda, T., and Takano, Y., "The Financial Macro-econometric Model (FMM, 2022 Version)," *BOJ Reports & Research Papers*, March 2023.

⁵⁷ The stress testing targets 109 banks and 247 *shinkin* banks. The simulation period is from the April-June quarter of 2023 through the January-March quarter of 2026. For the main economic and financial variables for and simulation results of the assumed scenarios, refer to the "Scenario Tables" on the Bank's website.

⁵⁸ Of the policy measures implemented since the start of the pandemic, the simulation in the baseline scenario does not take the effects of payments from the government on corporate profits into account. As in previous issues of the *Report*, the scenario assumes that zero-zero loans are repaid over a period of five years from fiscal 2023. Specifically, it is assumed that firms start to pay interest from fiscal 2023, which lowers their ICRs. The same assumptions are made in the financial stress scenario and the inverted yield curve scenario.

this time, reflecting an increase in valuation gains on stockholdings and a decrease in valuation losses on foreign bondholdings. The decrease in valuation losses reflects the reduction in banks' foreign bond positions to curtail the risk of foreign currency interest risk.

Chart V-2-1: Decomposition of capital adequacy ratio: Baseline



Note: 1. Indicates the contribution of each factor to the difference between the capital adequacy ratios at end-March 2023 and the end of the simulation period (as of end-March 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. The transitional arrangements for domestic banks are taken into consideration.

On the other hand, for internationally active banks and domestic banks excluding *shinkin* banks, the contribution of PPNR excluding trading income in pushing up capital adequacy ratios is smaller than in the previous *Report*. These banks have increased market funding such as medium- to long-term FX and currency swaps in order to reduce foreign currency funding liquidity risk (see Section D of Chapter IV). For this reason, it is less likely than before that their foreign net interest income improves during the simulation period due to the rise in market interest rates.

2. Financial stress scenario

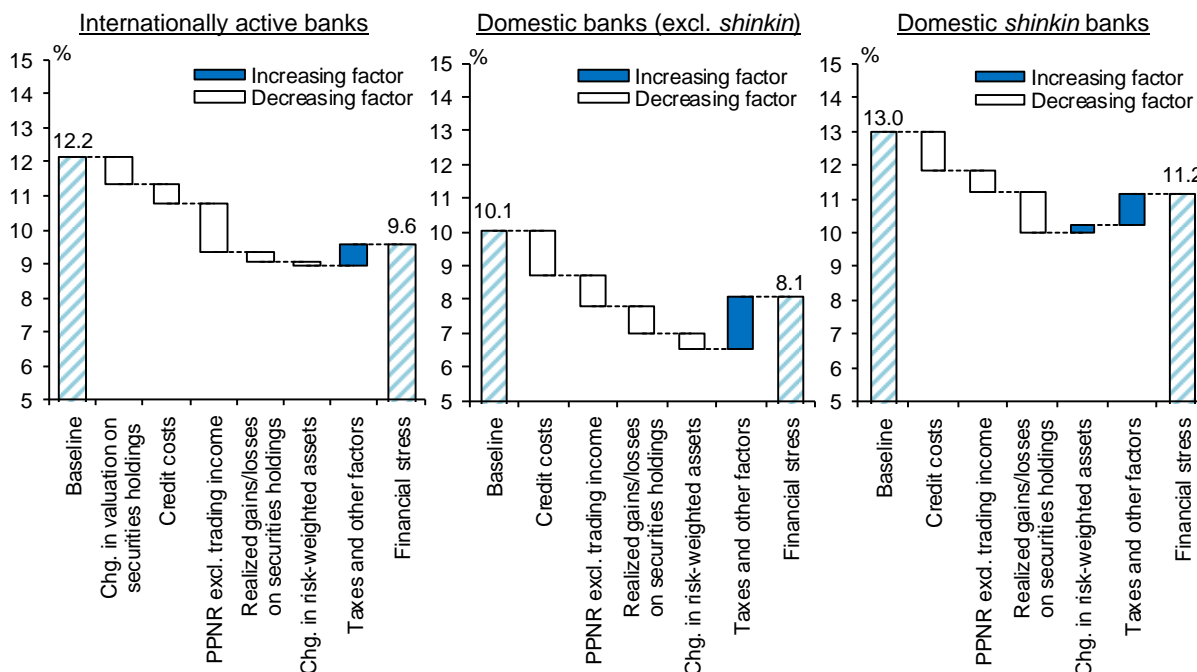
The financial stress scenario assumes that global financial markets experience a negative shock in the October-December quarter of 2023 comparable to that during the global financial crisis. Regarding financial variables, it is assumed that, with domestic and foreign interest rates declining to record low levels, prices of risky assets plummet and the yen appreciates in foreign exchange markets.⁵⁹ Regarding economic variables, 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 2025 remain above regulatory levels on average for all types of banks (Chart V-2-2). However, the ratios are substantially lower than in the baseline scenario. The decrease in capital adequacy ratios reflects

⁵⁹ 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.

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 prices of risky assets (deterioration in valuation and realized gains/losses on securities holdings).

Chart V-2-2: 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-March 2026) under the baseline scenario and the financial stress scenario.

3. Inverted yield curve scenario

The inverted yield curve scenario assumes that yield curves in the United States and Europe become further inverted and remain so for a prolonged period (Chart V-2-3). 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 and remains high for one year before decreasing toward the end of the simulation period. The interest rates for other maturities are assumed to be formed in line with the pure expectations hypothesis and move in a manner consistent with developments in policy rates. Therefore, it is assumed that the rise in long-term interest rates remains relatively small. Yields remain substantially inverted for most of the simulation period, with market interest rates, especially in the short-term zone, remaining high. Similarly, yield curves in Europe are

Chart V-2-3: U.S. yield curves

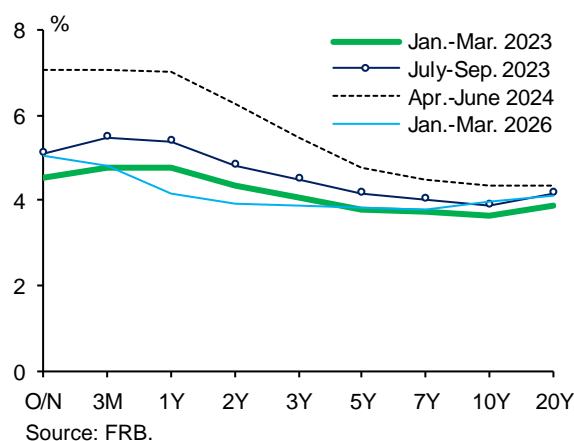
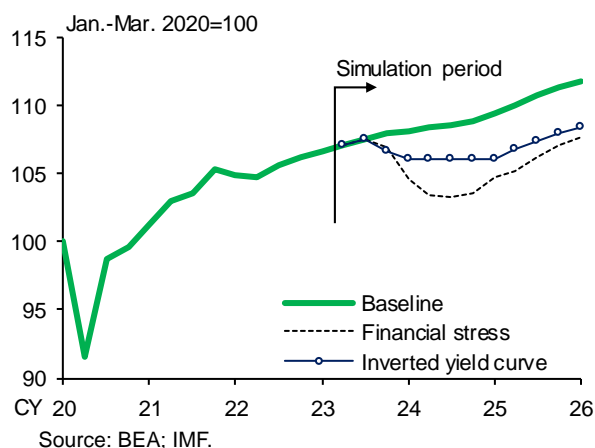


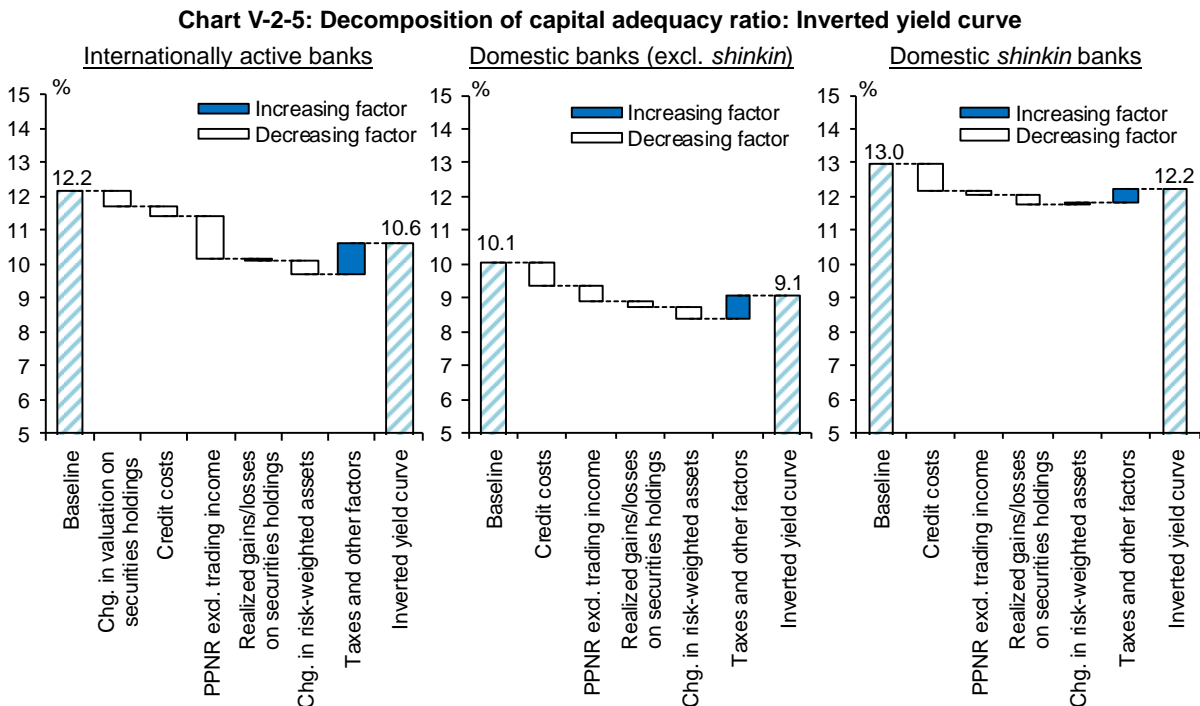
Chart V-2-4: U.S. GDP



assumed to remain inverted, like those in the United States. Meanwhile, it is assumed that crude oil prices rise and prices of risky assets fall as the real economy deteriorates.

Turning to the real economy, both the U.S. and European economies are assumed to decelerate. The growth rate of the U.S. economy is assumed to turn slightly negative in the second half of fiscal 2023 and remain zero thereafter for one year (Chart V-2-4). In the model, Japan's economy slows down endogenously due to the rise in foreign interest rates and deterioration in foreign economies, and the growth pace is roughly the same as that of the U.S. economy.

The simulation results indicate that capital adequacy ratios at the end of fiscal 2025 are lower than in the baseline scenario for all types of banks (Chart V-2-5).⁶⁰ 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. However, the decrease in capital adequacy ratios is relatively modest compared to the financial stress scenario. Overall, the ratios 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 yield curves remaining substantially inverted for a prolonged period.



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-March 2026) under the baseline scenario and the inverted yield curve scenario.

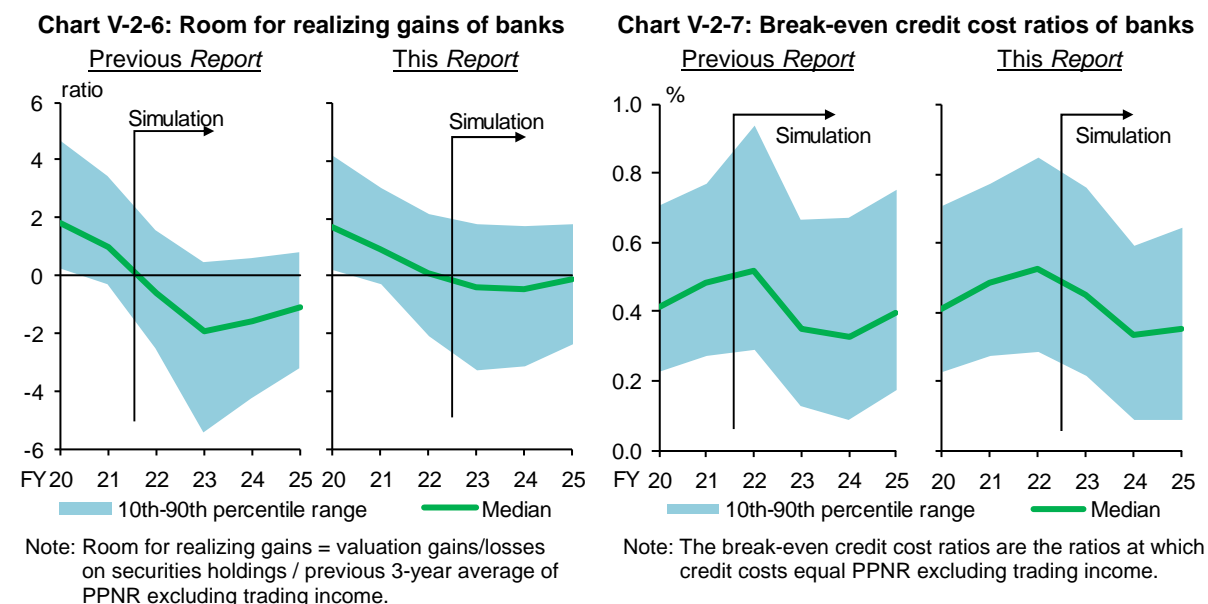
Loss-absorbing capacity under the inverted yield curve

Compared to the simulation results in the previous *Report*, banks are more resilient against the stress of foreign yield curves remaining inverted for a long time. For all types of banks, capital adequacy ratios in the event of stress are also higher than in the previous *Report* (left panel of Chart I-14).⁶¹ In particular, the ratio for internationally active banks improves by slightly more than

⁶⁰ Investment trust dividends are not explicitly taken into account in the FMM. The impact of rising foreign interest rates on investment trust dividends is calculated separately, as in the previous issues of the *Report*.

⁶¹ Capital adequacy ratios in the event of stress in the previous issue of the *Report* were 9.2 percent for internationally active banks, 8.8 percent for domestic banks excluding *shinkin* banks, and 11.7 percent for domestic *shinkin* banks.

1 percentage point. Capital adequacy ratios are pushed up by the improvement in valuation gains/losses on securities holdings as a result of rebalancing during fiscal 2022. The decline in banks' room for realizing gains, which represents their loss-absorbing capacity on an economic value basis, is smaller than in the previous *Report* (Chart V-2-6). The share of banks for which room for realizing gains (net valuation gains/losses on securities holdings) turns negative during the simulation period has declined from 80 percent in the previous *Report* to close to 50 percent in this *Report*.



Nevertheless, the room for realizing gains still turns negative for nearly half of all banks. Although the degree to which such room turns negative is smaller than in the previous *Report*, many banks lose the resources to offset losses in a flexible manner during the simulation period. In addition, break-even credit cost ratios, which represent profit buffers, show a decline overall, as in the previous issue of the *Report* (Chart V-2-7). This implies that banks are more vulnerable to additional stress. This vulnerability could surface if foreign interest rates remain higher for longer than assumed in the inverted yield curve scenario. The following examines the impact of higher foreign interest rates through the deposit cost and credit cost channels.

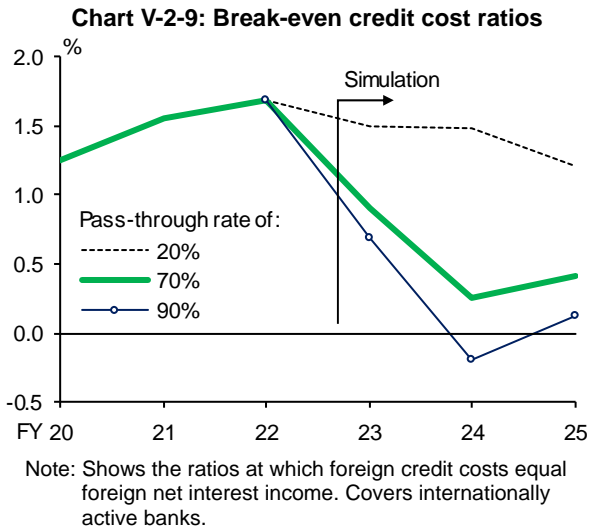
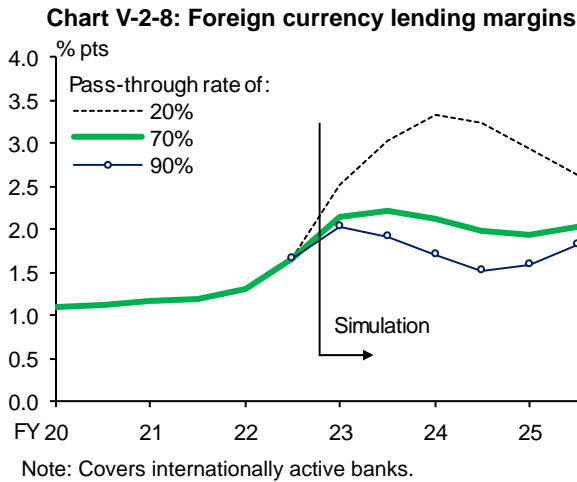
Impact through the deposit cost channel

Chart V-2-8 shows the foreign currency lending margins depending on different interest rate pass-through to foreign currency deposit funding. Deposit funding accounts for 90 percent of the funding of loans in banks' international business.⁶² Therefore, lending margins during a phase of rising interest rates greatly depend on the interest rate pass-through to deposit funding. For comparison, three different cases of interest rate pass-through are assumed to examine the downward pressure on banks' loss-absorbing capacity: 70 percent, which is the historical average pass-through rate (corresponding to the pass-through rate in the simulation); 90 percent, which is higher than the historical average; and a low pass-through rate of 20 percent corresponding to U.S. banks' rate for their deposits.

When interest rates are rising, the higher the pass-through to deposit funding, the higher the interest rate on deposits, and the more likely lending margins are to shrink. This is the reason why

⁶² Taking banks' international and domestic business together, deposit funding accounts for 70 percent of the funding of foreign currency loans.

the improvement in lending margins of Japan's major banks has been smaller compared to U.S. banks during the current phase of rising interest rates. The actual pass-through rate to deposit funding is around 70 percent for Japan's major banks, while it is only slightly more than 20 percent for U.S. banks. On the other hand, if the pass-through rate increases to 90 percent, the break-even credit cost ratio (foreign net interest income/foreign loans outstanding) at the end of the rising interest rates phase will be negative (Chart V-2-9). This means that banks cannot absorb credit costs through net interest income.



Conversely, when interest rates are declining, the lower the pass-through rate, the higher deposit rates will remain. Therefore, lending margins are likely to shrink. However, a look at rising and declining interest rate phases through the cycle shows that the lower the pass-through rate, the higher lending margins will be, since deposit rates are kept lower (Chart V-2-8). This means that it is important for banks to secure stickier deposits in order to both reduce funding liquidity risk and ensure sufficient loss-absorbing capacity.

Impact through the credit cost channel

A situation of foreign interest rates remaining higher for longer leads to a deterioration not only in banks' but also firms' financial conditions. If ICRs, which represent firms' interest payment capacity, continue to deteriorate, the risk of downgrades increases. Chart V-2-10 shows estimates of the percentage increase in loans classified as "special attention" and below, applying different combinations of higher foreign interest rates in terms of the level and duration.⁶³ The red tiles show that the percentage increase in loans classified as "special attention" and below is larger -- that is, the risk of downgrades is greater.

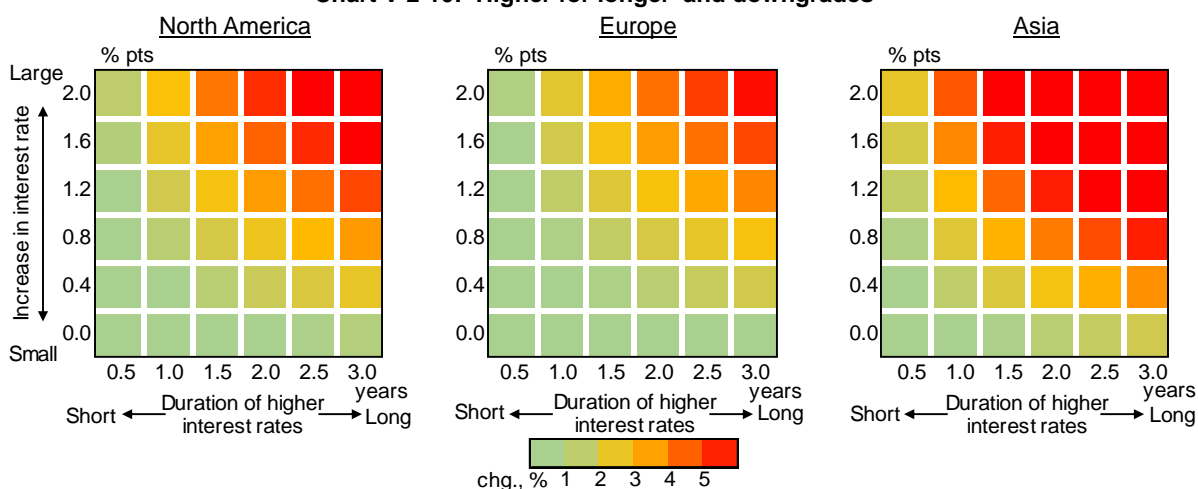
The chart shows that for loans to North America, Europe, and Asia, the larger the increase in interest rates and the longer interest rates stay high, the greater the risk of downgrades. This tendency is particularly pronounced for loans to Asia. Large loans in Asia are concentrated among firms with high financial leverage and low ICRs.⁶⁴ Such firms are more vulnerable to interest rates that are higher for longer. Moreover, converting the impact of downgrades to credit costs, credit cost ratios increase non-linearly with interest rates staying higher for longer (Chart V-2-11). While

⁶³ Specifically, Chart V-2-10 shows the results of simulating separately for each combination in terms of the level and duration of higher foreign short-term interest rates, and while holding all else equal, the additional increase in firms that would be downgraded to "special attention" and below due to a deterioration in their ICR.

⁶⁴ For details, see Section B of Chapter IV in the April 2023 issue of the *Report*.

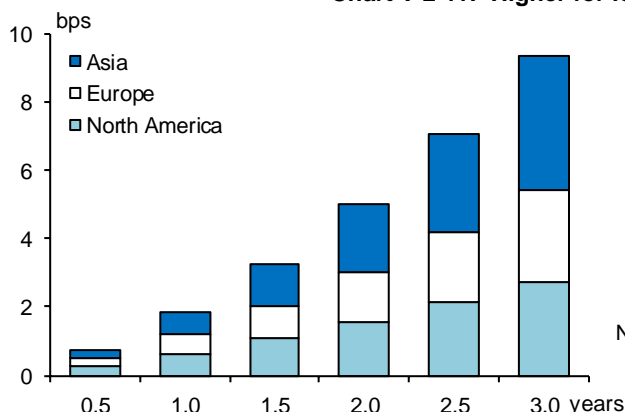
the credit costs are not necessarily large from a macro perspective, what warrants attention is that such credit risks are concentrated in loans to Asia.

Chart V-2-10: 'Higher for longer' and downgrades



Note: Shows the percentage increase in loans classified as "special attention" and below, applying different combinations of the increase in foreign interest rates relative to the baseline scenario and duration of higher interest rates, in different colors. Covers the three major banks.

Chart V-2-11: 'Higher for longer' and credit costs



Note: Shows the cumulative foreign credit cost ratios corresponding to the duration of foreign interest rates remaining 2 percentage points higher relative to the baseline scenario. Covers the three major banks.

4. Evaluation of the resilience of the financial system

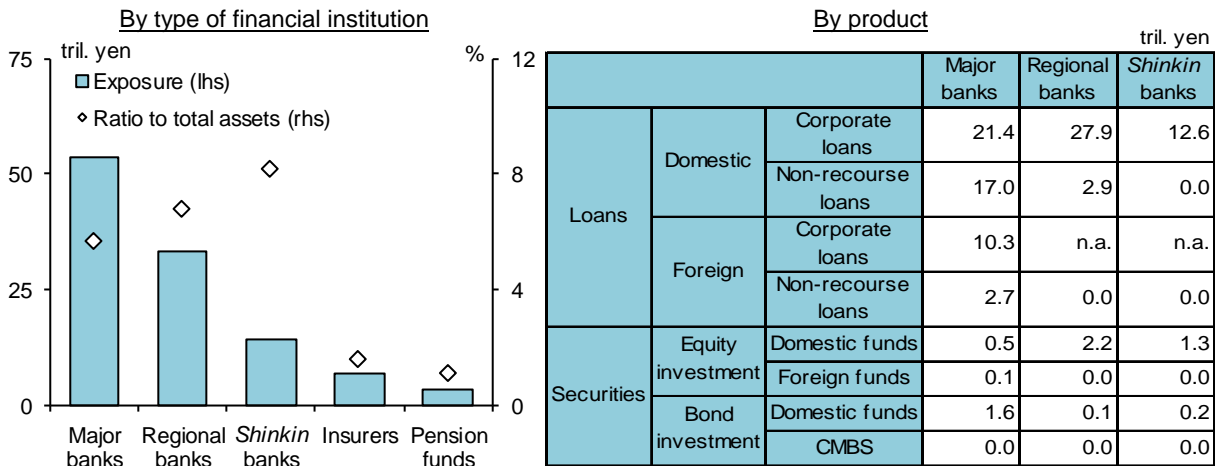
The results of the macro stress testing indicate that Japan's financial system would remain stable even in the event of a certain level of stress. Japanese banks on the whole are resilient to stress events such as financial stress similar to that experienced during the global financial crisis or an inverted foreign yield curve. Ample capital and liquidity enhance the resilience of the financial system as a whole. The recent rebalancing of interest-rate portfolios has also contributed to improvements in banks' resilience against the risk of rising interest rates.

However, there is a high degree of uncertainty over future developments in foreign financial and economic conditions. With inflationary pressure remaining, there is a risk that, contrary to market expectations, foreign interest rates will rise and remain higher for longer. If, under these circumstances, there is an increase in the interest rate pass-through to foreign currency deposit funding, banks may need to rebalance further to avoid negative interest margins. Moreover, an increase in downgrades of foreign firms that are highly sensitive to interest rates could increase credit costs. Banks therefore need to be prepared to appropriately manage a variety of risks associated with interest rate fluctuations, based on the premise that uncertainty will remain high.

Box 1: Contagion risks in the commercial real estate market

Japanese financial institutions have various forms of exposure to commercial real estate (Chart B1-1). In the area of lending, major banks extend not only domestic loans but also loans in the United States, although the share is small (Chart B1-2). In the area of investment, that in real estate funds is part of regional and *shinkin* banks' alternative investment. If a correction in foreign real estate markets leads to global contagion, the effects could be felt in Japan's financial system through various direct and indirect channels.

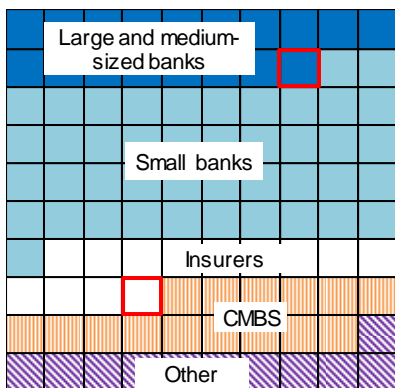
Chart B1-1: Real estate-related exposure of Japanese financial institutions



Note: Commercial real estate exposure is calculated. Data for "Insurers" and "Pension funds" are based on published information. Data as of end-March 2023 (data of the General Insurance Association of Japan are from the website as of September 2023).

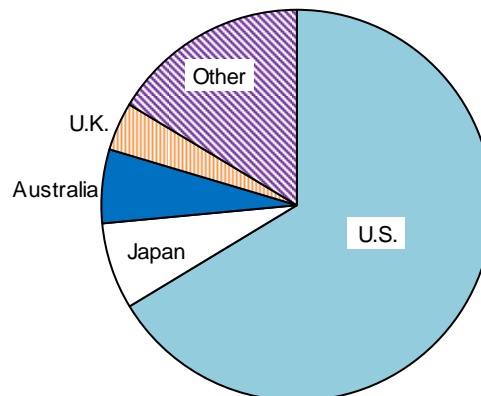
Source: GPIF; Pension Fund Association; The General Insurance Association of Japan; The Life Insurance Association of Japan; BOJ.

Chart B1-2: U.S. commercial real estate credit



Note: 1 cell indicates 1 percentage share of credit. The red frames indicate Japanese financial institutions.
Source: FRB; BOJ.

Chart B1-3: REIT market composition by region

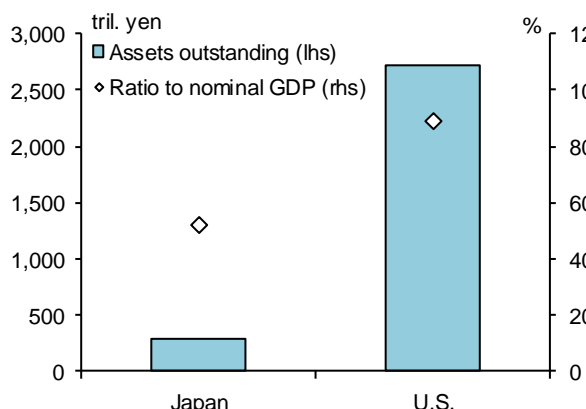


Note: Data as of August 2023.
Source: S&P Dow Jones Indices.

Chart B1-3 shows the regional composition of the global REIT market. The U.S. market is the largest, accounting for almost 70 percent of the global market capitalization of 221 trillion yen (as of end-August 2023). It is followed by Japan, which accounts for nearly 10 percent, and then Australia and the United Kingdom. When global REIT funds, which diversify their investment, allocate investment, one of the criteria is the regional composition of the market, meaning that the United States accounts for a large share of their investment. If there were to be a substantial repricing in the U.S. REIT market, the impact would likely be felt around the world through the rebalancing of globally diversified funds.

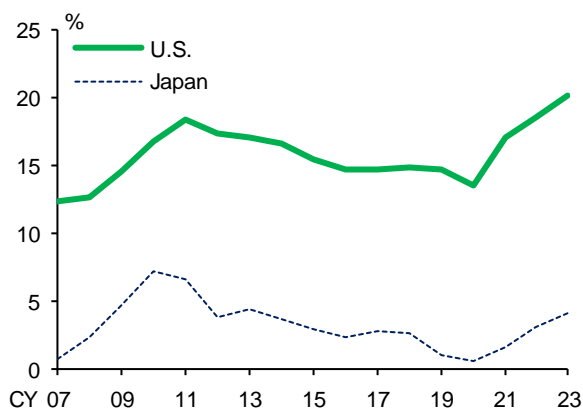
The U.S. commercial real estate market is enormous, at about ten times the size of the Japanese market (Chart B1-4). In terms of the ratio to nominal GDP, the U.S. market is almost twice the size of the Japanese market. However, the U.S. market has been gradually experiencing correction. Office vacancy rates in the U.S. market have increased substantially since the outbreak of the pandemic and already exceed the peak experienced since the global financial crisis, in 2011 (Chart B1-5). It has been suggested that the spread of remote work may have led to a structural upward shift in vacancy rates in the United States and that vacancy rates may rise further when lease contracts come up for renewal in the future.⁶⁵

Chart B1-4: Commercial real estate market size



Note: The data for Japan and U.S. are based on the July 2023 survey and the June 2021 survey, respectively.
Source: Cabinet Office; FRED; NAREIT; NLI Research Institute; Value Management Institute, Inc.

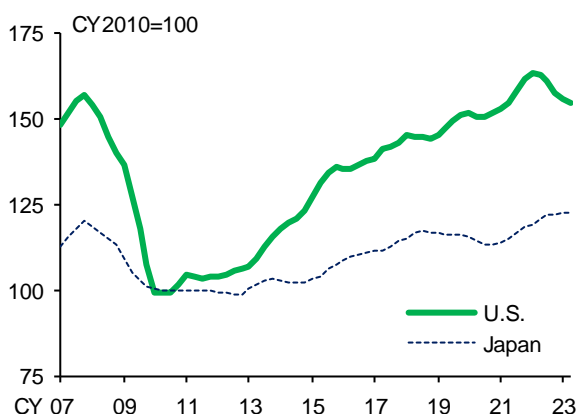
Chart B1-5: Office vacancy rates



Note: Latest data as of the January-March quarter of 2023.
Source: JLL.

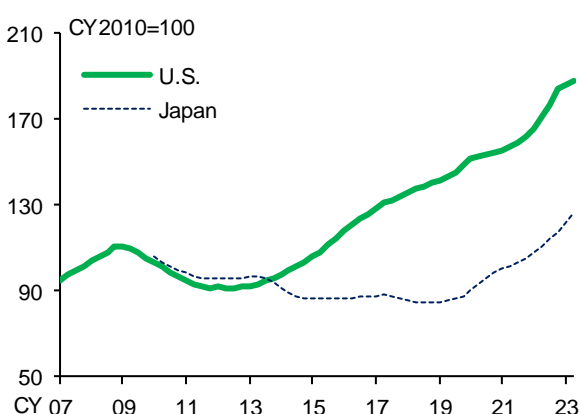
Until last year, commercial real estate prices (in real terms adjusted for the consumer price index) had been rising around the world for the past decade (Chart B1-6). Prices in Japan's market also increased, by about 20 percent over the past decade. Among advanced country markets, the price increase in the United States stood out, reaching 50 percent over the same period. Prices in the U.S. market, which increased substantially and reached the peak at the beginning of 2022, started to decline. While repricing so far has been small, potential for further repricing may not be so small.

Chart B1-6: Commercial real estate prices



Note: The data are deflated by the CPI in each country.
Latest data as of the April-June quarter of 2023.
Source: BIS; FRED; Ministry of Internal Affairs and Communications; Ministry of Land, Infrastructure, Transport and Tourism.

Chart B1-7: Commercial real estate loans



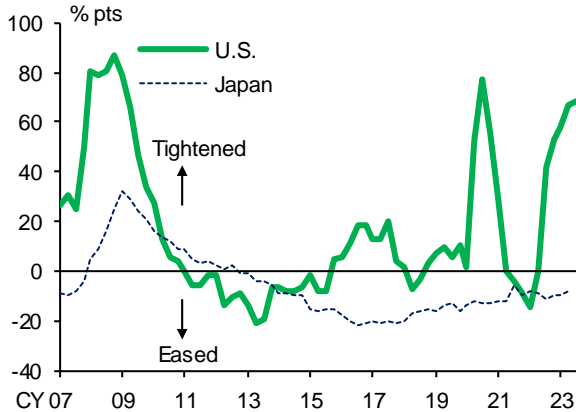
Note: 1. The data for Japan indicate real estate loans from banks (for large real estate businesses and SPCs).
2. Latest data as of June 2023.
Source: FRB; BOJ.

⁶⁵ For details, see White, C., "Commercial Real Estate Market Stress Poses a Challenge to Banks," Federal Reserve Bank of St. Louis On the Economy Blog, July 2023.

In its Financial Stability Report (May 2023), the Federal Reserve highlights that actual prices may have fallen further as distressed properties are less likely to trade in the market.

In the United States, commercial real estate loans have built up rapidly over the past years (Chart B1-7). The pace of such buildup in the United States has been much faster than in Japan. The main providers of these loans are local small banks (Chart B1-2). Attention has been paid to changes in their lending standards, reflecting the impact of successive policy rate hikes as well as the failures of U.S. banks in March 2023 (Chart B1-8).

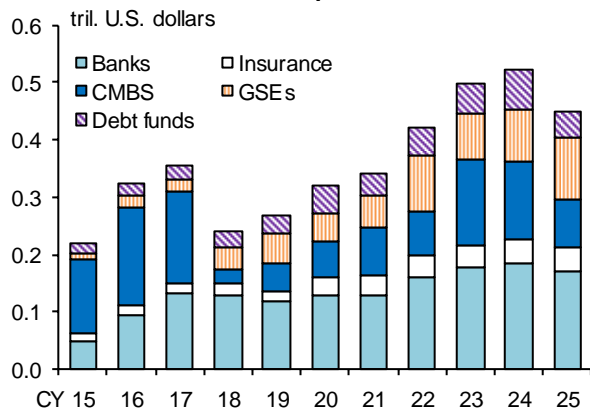
Chart B1-8: DI of lending standards for commercial real estate loans



Note: 1. The data for Japan indicate the lending attitude of financial institutions as perceived by real estate firms.
2. Latest data for U.S. and Japan are as of July 2023 and June 2023, respectively.

Source: FRB; BOJ.

Chart B1-9: U.S. real estate loans by redemption date



Note: Covers commercial real estate loans in the U.S.
Source: Newmark.

In general, commercial real estate lending is based on the premise that loans are refinanced. Refinancing the large amount coming due will not be easy (Chart B1-9). Properties that cannot be refinanced will be sold in the market, which could exert even greater downward pressure on market prices. Against this backdrop, the impact of fluctuations in the United States and other foreign markets on the Japanese market warrants close attention.

Box 2: The stickiness of deposits and its variability

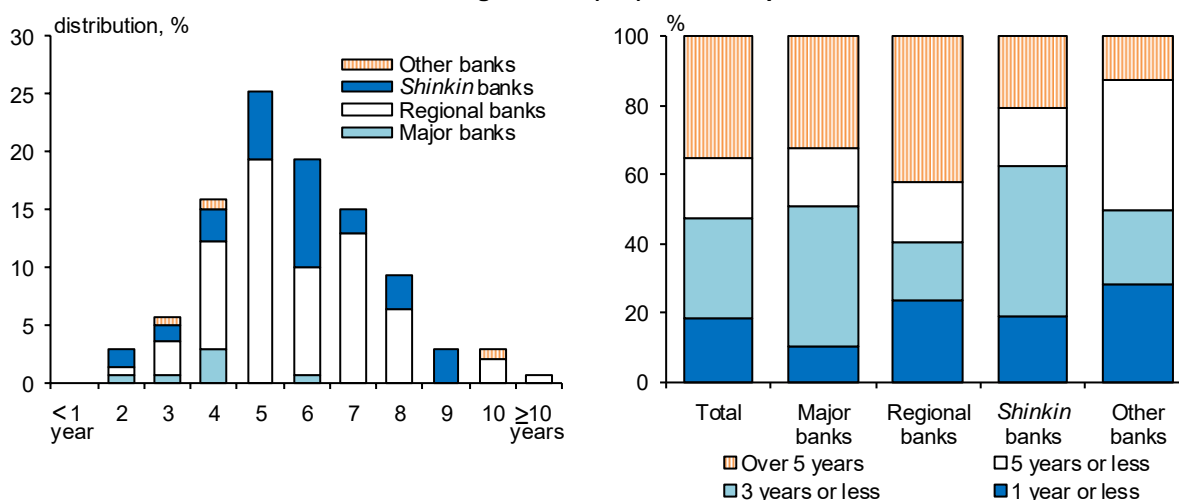
What are sticky deposits?

Securing deposits that are sticky and less sensitive to interest rate changes is the foundation for a stable funding base and leads to controlling the amount of interest rate risk in the banking book (IRRBB). In this sense, securing these deposits is an important risk management tool for depository financial institutions. While there are various definitions of sticky deposits, most commonly they are defined as core deposits. For regulatory purposes, core deposits in the Financial Services Agency's supervisory guidelines are defined as deposits that remain at the bank for an extended period of time without being withdrawn, even though there is no clearly defined period for interest rate revisions and depositors can withdraw at any time. Among demand deposits that have no contractual maturity and can be withdrawn at any time, such as ordinary deposits, core deposits refer to deposits that remain in banks' accounts for a long time even with interest rate fluctuations.

Regulatory core deposits are measured using either the standardized approach or the internal modeling approach. Under the standardized approach, the maturity of core deposits is set as a range with a maximum maturity of up to 5 years and an average maturity of 2.5 years or less. Moreover, the size of core deposits is capped at the lowest of the following with regard to demand deposits: (1) the minimum amount outstanding over the past five years, (2) the difference between the current amount outstanding and the maximum annual outflows over the past five years, or (3) 50 percent of the current amount outstanding. Under the internal modeling approach, on the other hand, the maturity and amount of core deposits are derived from a model of core deposits that models depositor behavior. There are several core deposit models, and their basic procedure is as follows: based on the time series model of demand deposits, the demand deposits that remain in accounts even when interest rates rise are measured and then allocated to different remaining maturities.

Looking at the performance to date shows that deposits in Japan have been highly sticky. Since 2005, when the full protection of deposits was removed, Japanese banks have not experienced an outflow of deposits on a large scale. Moreover, in Japan, there are a limited number of alternative financial products where such deposits could go, such as MMFs in the United States. For this

Chart B2-1: Distribution of the average maturity (lhs) and maturity composition of the outstanding amount (rhs) of core deposits



Note: The left-hand chart covers banks that use the internal modeling approach; the right-hand chart covers all banks.
Data as of end-March 2023.
Source: BOJ.

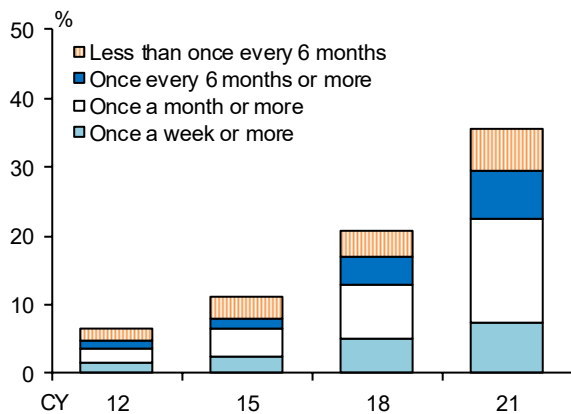
reason, the maturity of core deposits measured by models often exceeds an average maturity of 2.5 years, which is the level set in the standardized approach (Chart B2-1). About 30 percent of banks have core deposits with a maximum maturity of 10 years or more, while about 20 percent of banks have core deposits with an average maturity of 5 years or more. In addition, nearly 40 percent of core deposits have a remaining maturity of over 5 years. By securing core deposits with long maturities, the amount of interest rate risk in the banking book, especially for regional banks, has been well controlled (Chart IV-3-5).

Is the stickiness of deposits fixed?

However, as suggested by the runs at U.S. and European banks in March 2023, the stickiness of deposits is "state-dependent" and not necessarily fixed. Even small retail deposits, which generally are considered to be sticky, may no longer be sticky if there is a loss of confidence by depositors. With regard to the stickiness of deposits in Japan, some issues have been highlighted. The first is the difficulty of measuring such stickiness. Banks have not experienced a phase of large interest rate rises since regulations of deposit interest rates were fully lifted in 1994. Nor have they faced any major crisis of confidence since the removal of the full protection of deposits. With limited experience of stress events, it is not easy to measure the actual stickiness of deposits. For this reason, various improvements have been made in the internal models used for measuring core deposits.⁶⁶

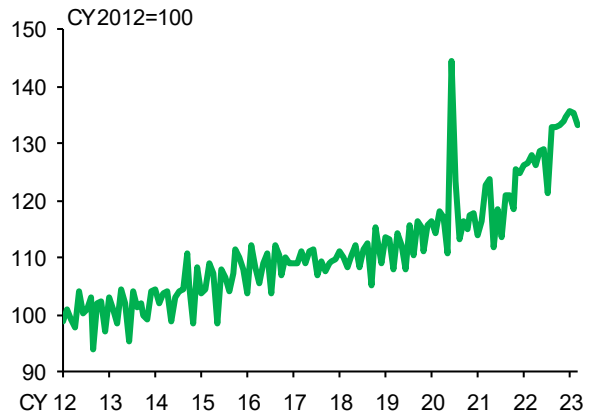
Second, there may be structural changes in the stickiness of deposits. As pointed out in Section E of Chapter IV, the use of online banking in Japan, while relatively low compared to other countries, has been on an upward trend (Chart B2-2). The introduction of a variety of payment services and highly convenient mobile services has lowered the switching cost of deposits and therefore may have reduced their stickiness.⁶⁷ In fact, the turnover rate of demand deposits, as represented by the number of transfers per account, has been trending upward over the past decade (Chart B2-3).

Chart B2-2: Usage rate of online banking



Note: Shows the usage rate of mobile banking for smartphones.
Source: Japanese Bankers Association.

Chart B2-3: Turnover rate of demand deposits



Note: Shows the number of small-value transfers per account (seasonally-adjusted). Latest data as of March 2023.
Source: Japanese Banks' Payment Clearing Network; BOJ.

⁶⁶ For example, some models assume that changes in demand deposits are symmetric during periods of rising and falling interest rates, while others use observations for phases of rising interest rates before regulations of deposit rates were fully lifted. For details, see Financial System and Bank Examination Department, "Survey on Core Deposit Modeling in Japan: Toward Enhancing Asset Liability Management," *BOJ Reports & Research Papers*, March 2014.

⁶⁷ For details on the impact of the spread of online banking on the stickiness of deposits, see Koont, N., Santos, T., and Zingales, L., "Destabilizing Digital 'Bank Walks'," New Working Paper Series, no.328, The University of Chicago Booth School of Business, May 2023.

Third, as noted earlier, the stickiness of deposits is "state-dependent." In addition to basic factors such as the retail deposit ratio, there may be other factors that explain changes in the stickiness of deposits and its key determinants -- switching costs. To examine this issue, this box presents a panel estimation for banks (excluding the three major banks) during the short period (July 2006 to October 2008) when changes in deposit rates were observed (Chart B2-4). In the estimation, the interest rate on time deposits was used as the dependent variable, while (1) the retail deposit ratio to represent the composition of deposits, (2) the loan-to-deposit ratio (loans outstanding/deposits outstanding) to represent banks' balance sheet structure, (3) the Herfindahl-Hirschman Index (HHI) to represent banks' deposit market share, and (4) the deposit interest rate of the three major banks were used as explanatory variables. Moreover, the levels of lending interest rates and deposit interest rates, as well as the amount of deposits outstanding, were included as control variables.⁶⁸

Chart B2-4: Effect on pass-through of interest rate

		Dependent variable: Time deposit rate (%)	
		Model 1	Model 2
Explanatory variables	Retail deposit ratio (%)	-0.295***	-0.325***
	Loan-to-deposit ratio (%)	0.223**	0.227**
	HHI	-0.171***	-0.207***
	Deposit rate of the three major banks (%)	0.492***	0.488***
	NPL ratio (%)	—	0.428***
	Level of the deposit rate before the policy rate hike (%)	-0.956***	-0.947***
	Deposits outstanding (log)	-0.018***	-0.014**
	Lending rate (%)	0.021	0.023
	Constant	0.794***	0.750***
R ² : within / between / overall		0.187 / 0.372 / 0.237	0.188 / 0.366 / 0.235
Sample size		10,763	10,763

Note: 1. Shows the estimation results for panel regression (random effects model). The estimation period is from July 2006 to October 2008. All explanatory variables are lagged by 1 period except for "Level of the deposit rate before the policy rate hike" and "Lending rate."

2. *** and ** indicate statistical significance at the 1 percent and 5 percent levels, respectively.

Source: BOJ.

The estimation results (Model 1) show that the parameter estimate for the retail deposit ratio has a negative sign and is statistically significant. This captures the fact that a higher retail deposit ratio is associated with a higher stickiness of deposits due to the relatively high switching costs for retail deposits. The parameter estimate for the loan-to-deposit ratio is positive and statistically significant. This indicates that banks have an incentive to set deposit rates higher when the loan-to-deposit ratio is high.

The parameter estimate for the deposit interest rate of the three major banks is also positive and statistically significant. This shows that other banks tend to follow the three major banks in terms of revising their deposit interest rates. A similar pattern can be observed in individual regions. The leading regional banks are the first to revise their deposit rates, followed by surrounding banks. Thus, competition in the deposit market also influences the stickiness of deposits to some extent. Given the increase in the market presence of internet-only banks after the estimation period, it is possible that the stickiness of deposits, which is determined by the competition in the deposit market, has changed further.

⁶⁸ Strictly speaking, for the dependent variable and some explanatory variables, such as the deposit and lending interest rates, the pass-through of changes in the policy rate was employed. Note that due to data constraints, interest rates on time deposits with short maturities rather than interest rates on liquid deposits were used in the analysis.

Next, to examine the effect of depositors' confidence on the stickiness of deposits, banks' non-performing loan (NPL) ratio was added as an explanatory variable, as a proxy for depositors' confidence. As the estimation results (Model 2) show, the parameter estimate for the non-performing loan ratio is positive and statistically significant. This means that the higher the non-performing loan ratio and the lower depositors' confidence, the lower the switching cost of deposits. All else being equal -- such as the retail deposit ratio and the loan-to-deposit ratio -- the stickiness of deposits of banks with low depositor confidence is likely to be lower than that of other banks.

Banks, as they have done to date, need to periodically examine the stickiness of their own deposits. At that time, they should bear in mind that the stickiness may be changing. Social media may also have an impact on such stickiness. A possible reason for the rapid runs on deposits at U.S. and European banks in March 2023 is that social media may have lowered the switching costs for deposits. Moreover, information about banks, including some inaccurate items, is circulating on social media. Against this background, some banks have made social media monitoring a part of their regular tasks.

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 includes common equities and retained earnings.

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

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

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

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

Capital adequacy ratios of domestic banks

Core capital ratio = core capital / risk-weighted assets

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