



BOJ
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Financial System FSR report



BANK OF JAPAN
OCTOBER 2017

The total of major banks, regional banks, and *shinkin* banks covered in this *Report* is as follows (as at September 30, 2017).

Major banks comprise the following 10 banks: Mizuho Bank; The Bank of Tokyo-Mitsubishi UFJ; Sumitomo Mitsui Banking Corporation; Resona Bank; Saitama Resona Bank; Mitsubishi UFJ Trust and Banking Corporation; Mizuho Trust and Banking Company; Sumitomo Mitsui Trust Bank; Shinsei Bank; and Aozora Bank. Regional banks comprise the 64 member banks of the Regional Banks Association of Japan (Regional banks I) and the 41 member banks of the Second Association of Regional Banks (Regional banks II). *Shinkin* banks are the 255 *shinkin* banks that hold current accounts at the Bank of Japan.

This *Report* basically uses data available as at September 30, 2017.

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Financial System Research Division,
Financial System and Bank Examination Department, Bank of Japan
post.bsd1@boj.or.jp

Objective of the *Financial System Report*

The Bank of Japan publishes the *Financial System Report* semiannually, with the objective of assessing the stability of Japan's financial system and facilitating communication with concerned parties on relevant tasks and challenges in order to ensure such stability.

The *Report* provides a regular and comprehensive assessment of Japan's financial system with considerable emphasis on the macroprudential perspective. The macroprudential framework refers to devising institutional designs and policy measures based on analyses and assessments of risks in the financial system as a whole, taking into account the interconnectedness of the real economy, financial markets, and financial institutions' behavior, to ensure the stability of the overall financial system.

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

In this October 2017 issue of the *Report*, regarding the potential vulnerabilities of the financial system, structural factors underlying financial institutions' low profitability and intensified competition as well as their impact are analyzed with particular focus, in addition to a regular assessment of financial institutions' risk profile and financial bases and macro stress testing assuming a tail event. More specifically, through an international comparison of financial institutions' profits and business resources, the *Report* (1) shows that Japanese financial institutions have little non-interest income and depend on net interest income as a profit source; and (2) examines the possibility that the number of employees and branches is excessive relative to demand. Furthermore, we review how, through competition among financial institutions, a nationwide and persistent decline in population and the number of firms will affect the relationship between firms and financial institutions, and the systemic risk.

Contents

Chapter I. Executive summary: comprehensive assessment of the financial system	1
Chapter II. Risks observed in financial markets	3
A. Global financial markets	
B. Japanese financial markets	
Chapter III. Examination of financial intermediation	14
A. Financial intermediation by financial institutions	
B. Developments in investment by institutional investors	
C. Developments in households' investment activities	
D. Financial intermediation through financial capital markets	
E. Financial Activity Indexes	
Chapter IV. Financial institutions' risk profile and financial bases	34
A. Credit risk	
B. Market risk	
C. Funding liquidity risk	
D. Financial institutions' capital adequacy	

Chapter V. Macro stress testing	49
--	----

Chapter VI. Financial institutions' profitability and potential vulnerability of the financial system	53
--	----

- A. Developments in financial institutions' profits
- B. Structure of financial institutions' profits: low net non-interest income ratio
- C. Competitive environment for financial institutions

Chapter VII. Concluding remarks	71
--	----

Box 1: Financial institutions' branch density and demand density

Box 2: Relationship between financial institutions' branch location and markups

Box 3: Intensified competition among regional banks and systemic risk

Glossary	79
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I. Executive summary: comprehensive assessment of the financial system

Developments in financial markets

In global financial markets, volatilities have remained at historically low levels amid the continued moderate growth of the global economy and solid corporate performance, despite concerns over geopolitical risks such as the situation in North Korea. No significant changes have been observed in global capital flows, including those of emerging markets, even as the Federal Reserve continued to raise its policy rate. While investors have maintained their risk-taking stance, stock prices have risen globally and credit spreads have also tended to narrow. Meanwhile, in Japan, the financial conditions have remained highly accommodative under the Bank of Japan's Quantitative and Qualitative Monetary Easing (QQE) with Yield Curve Control.

Examination of financial intermediation

Looking at financial institutions' loans, while the pace of growth in overseas loans has tended to slow against the backdrop of an increase in the cost of foreign currency funding, domestic loans outstanding have been growing at a moderately faster pace on a year-on-year basis, recently at around 3 percent. With financial institutions' active lending stances, demand for funds, especially by small firms, has been increasing. As for securities investment, financial institutions have maintained their stance of active risk taking, as some have restarted to increase their outstanding holdings of foreign bonds after reducing them somewhat, and the outstanding amount of their investment trusts has been on an upward trend. Institutional investors -- such as insurance companies and pension funds -- have continued to accumulate risky assets, particularly foreign bonds, amid the prolonged environment of low interest rates. Meanwhile, the issuance rates in the CP and corporate bond market have hovered at extremely low levels, and firms' debt financing has increased.

On the whole no imbalances in financial and economic activities can be observed while the funding conditions for the non-financial private sector have been highly accommodative. Against the background of financial institutions' active lending attitude and favorable issuing conditions for corporate bonds, total credit (measured as a ratio to GDP) has been increasing. In this environment, the corporate sector has been maintaining an active business fixed investment stance, supported by an expectation of improved corporate profits. The real estate market does not seem overheated on the whole, although transaction prices remain high in some places such as the Tokyo metropolitan area. In the commercial real estate market, it seems that the increase in real estate prices has been leveling off given the prospect of a supply increase in the future. In the real estate investment trust (REIT) market, there is no sign of further bullish expectations among investors. However, if stress arises in the global financial markets and a risk-off attitude spreads, this may possibly affect the domestic real estate market. Therefore, developments in the real estate market continue to warrant vigilance.

Stability of the financial system

No major imbalances have been observed in financial and economic activities, and financial institutions on the whole have generally strong resilience in terms of both capital and liquidity. Thus, it can be judged that Japan's financial system has been maintaining stability. Financial institutions have sufficient capital bases, which allow them to continue risk taking even if profitability faces downward pressure for the time being. Financial institutions' portfolio rebalancing through more active lending has been contributing to an improvement in economic developments,

and if this leads to more proactive economic activities by firms and households, this in turn is likely to bring about a recovery in financial institutions' profitability. However, there is a possibility that financial imbalances will build up and financial system stability will be impaired, if financial institutions shift toward excessive risk taking in order to maintain profitability as deposit and lending margins continue on a narrowing trend. On the other hand, if there is an increase in the number of financial institutions whose loss-absorbing capacity declines due to the continued weakening of their profitability, the financial intermediation function could weaken, adversely affecting the real economy.

Potential vulnerabilities due to the decline in financial institutions' profitability

The decline in financial institutions' profits is a phenomenon that can be observed not only in Japan but commonly in advanced economies, where the low interest rate environment has prevailed. However, even in this situation, the low profitability of Japanese financial institutions is striking from an international perspective. The number of financial institutions' employees and the number of branches may be in excess (overcapacity) relative to demand. This structural factor in turn leads to a decline in financial institutions' profitability through the intensified competition among financial institutions in Japan. As the firm exit rate has exceeded the firm entry rate, and thus the number of firms has decreased across Japan, bank branches' efforts to look for new transaction opportunities and boost their corporate business have led to an increase in the number of financial institutions that each firm transacts with. For firms, this means that they have been able to obtain more favorable loan conditions by increasing the number of financial institutions that each of them transacts with. However, if it becomes common for firms to choose the financial institution offering the lowest loan interest rate among a number of financial institutions when taking out a loan, regardless of whether the financial institutions have any transaction history or capacity to support businesses, this may lower the efficiency of capital allocation by discouraging financial institutions' information production activities in the medium to long run.

Challenges from a macroprudential perspective

The decline in population and the number of firms is a common shock occurring across Japan. In this situation, the intensification of competition among regional financial institutions would affect the systemic risk by increasing the effects of a common exposure, that is, by decreasing net interest income. In order to ensure both the efficiency and stability of Japan's financial system in the future, it is important for financial institutions to improve their profitability under the appropriate competitive environment. Specifically, it is important for financial institutions to (1) make efforts to strengthen their profitability by utilizing their core competence, that is, differentiating the financial intermediation services they offer and diversifying their profit sources through an increase in net non-interest income, (2) more closely manage their profitability and review the services they offer and the efficiency of their branch configuration taking into account, for example, the competitive pressure they face from other financial institutions, and (3) improve labor productivity through operational reforms and the appropriate allocation of equipment and employees. Moreover, another option to improve profitability could be through mergers, consolidations, and cooperation among financial institutions. The Bank of Japan will support such efforts of financial institutions through, for example, its off-site monitoring and on-site examinations and will continue to closely monitor, from a macroprudential perspective, the impact on the financial system of changes in the competitive environment.

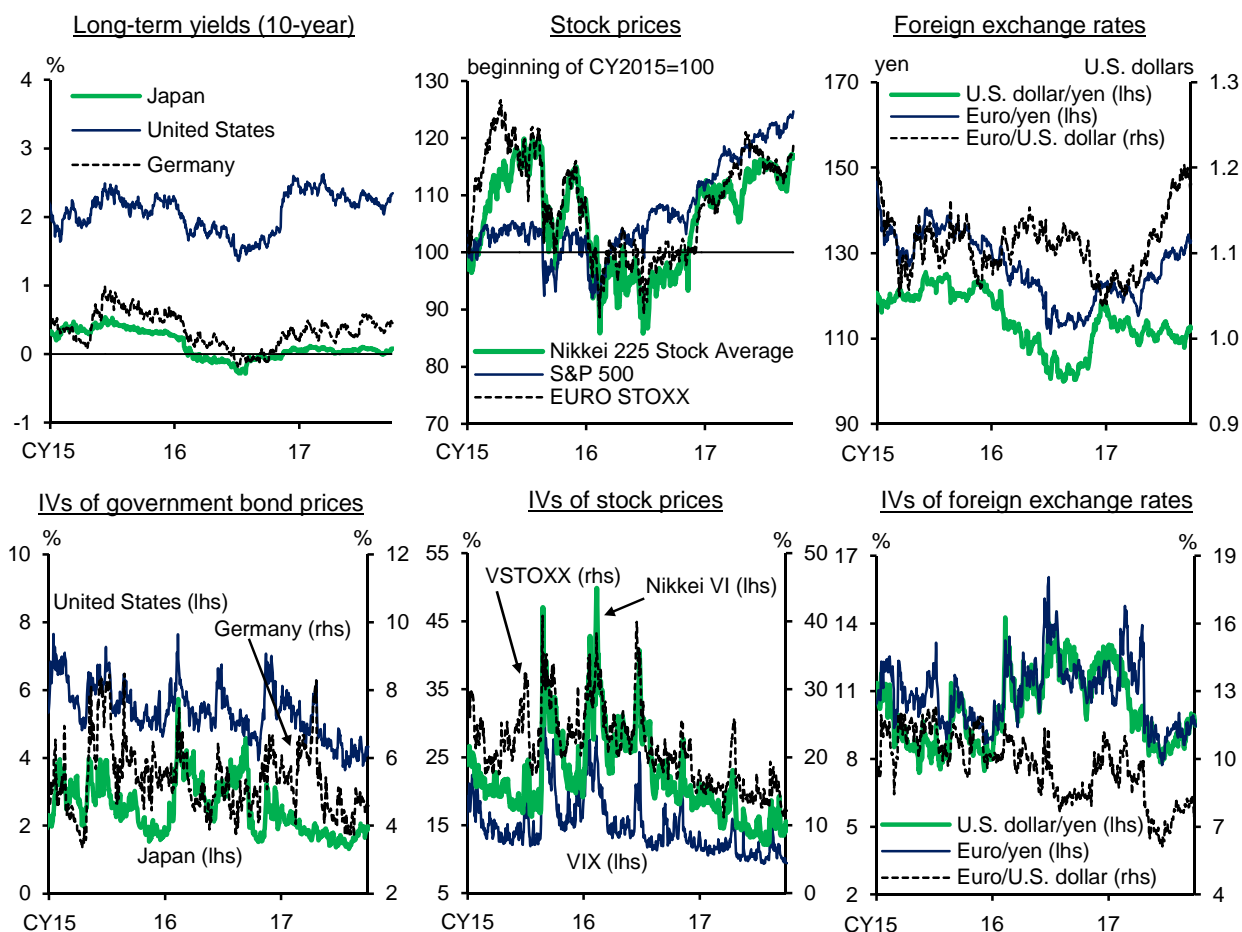
II. Risks observed in financial markets

This chapter summarizes the developments in financial markets at home and abroad mainly during the first half of fiscal 2017 and examines risks observed.¹

A. Global financial markets

In global financial markets, volatilities have remained at historically low levels amid the continued moderate growth of the global economy and solid corporate performance, despite concerns over geopolitical risks such as the situation in North Korea. No significant changes have been observed in global capital flows, including those of emerging markets, even as the Federal Reserve (FRB) continued to raise its policy rate. The price levels of risky assets such as stocks and corporate bonds have shifted upward globally with long-term interest rates having been at low levels in advanced economies (Chart II-1-1). However, as the prolonged low volatility could encourage investors to take further risk, careful attention should be paid to whether this would contribute to undermining global financial market stability in the future.

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



Note: 1. Implied volatilities (IVs) of government bond prices are based on the following data: S&P/JPX JGB VIX for Japan; TYVIXSM Index for the United States; IV of Euro-Bund Futures traded on Eurex for Germany, calculated by Bloomberg. IVs of foreign exchange rates are calculated by Bloomberg.

2. Data to September 29, 2017.

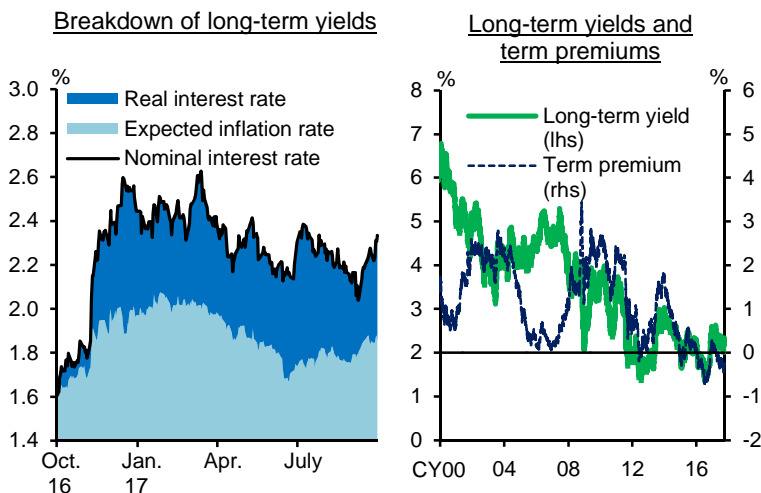
Source: Bloomberg.

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

Low interest rates and low volatilities

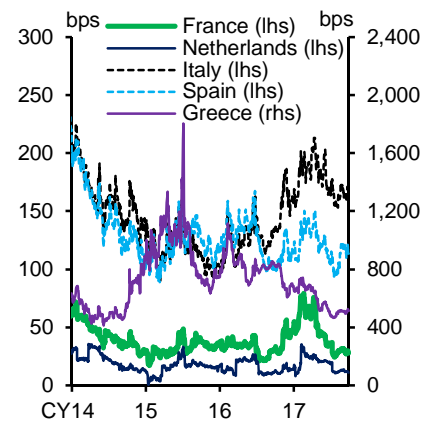
Although the FRB raised its policy rate in March and June 2017, U.S. long-term interest rates are more or less unchanged, mainly due to stable inflation expectations (Chart II-1-2). European long-term interest rates (yield spreads of European government bonds over German ones) rose temporarily due to political uncertainties, but have generally been stable since the French national election in April (Chart II-1-3). Furthermore, although long-term interest rates came under upward pressure during a certain period after late June, partly reflecting speculation about a reduction in monetary accommodation by the European Central Bank (ECB), they have generally remained range bound.

Chart II-1-2: U.S. interest rates (10-year)



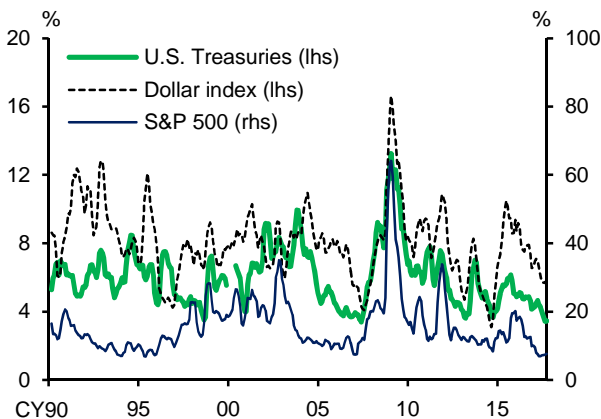
Note: 1. "Expected inflation rate" indicates the break-even inflation rate.
2. Data to September 29, 2017.
Source: Bloomberg; FRB.

Chart II-1-3: Yield spreads of European government bonds over German government bonds (10-year)



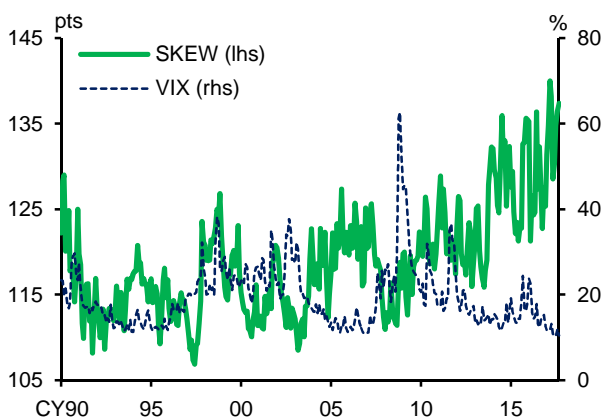
Note: Data to September 29, 2017.
Source: Bloomberg.

Chart II-1-4: HVs of U.S. stock and Treasury prices and the U.S. dollar exchange rate



Note: 1. Monthly averages of historical volatilities (HV). Latest data as at September 2017.
2. "U.S. Treasuries" indicates 10-year Treasury futures, excluding data from December 1999 to April 2000 that have breaks in series. "Dollar index" is calculated by Bloomberg.
Source: Bloomberg.

Chart II-1-5: IVs and SKEW of U.S. stock prices



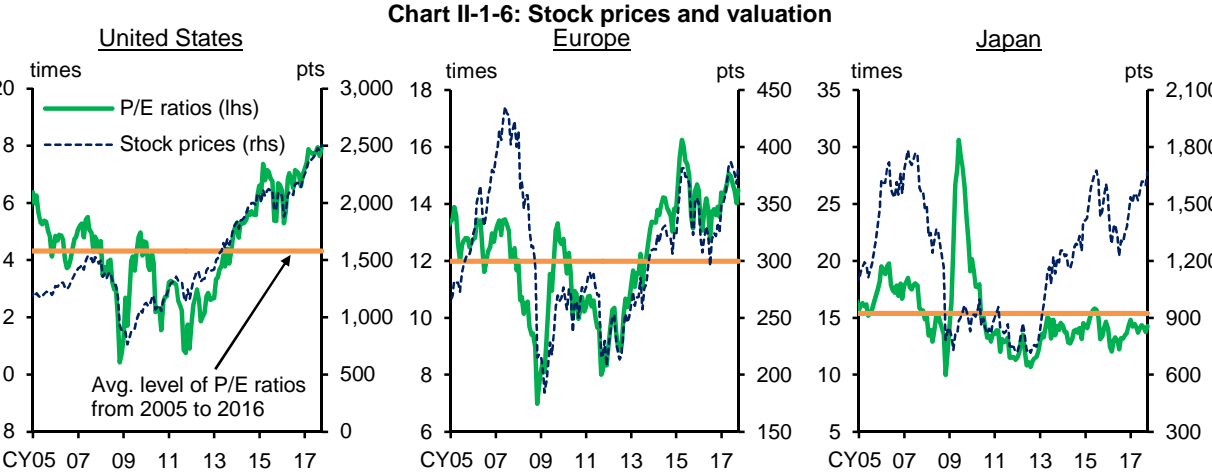
Note: 1. Monthly average. Latest data as at September 2017.
2. "SKEW" is calculated by CBOE.
Source: Bloomberg.

The global economy has continued to grow moderately, with long-term interest rates having been at low levels in advanced economies. In addition, uncertainties in the global economic outlook

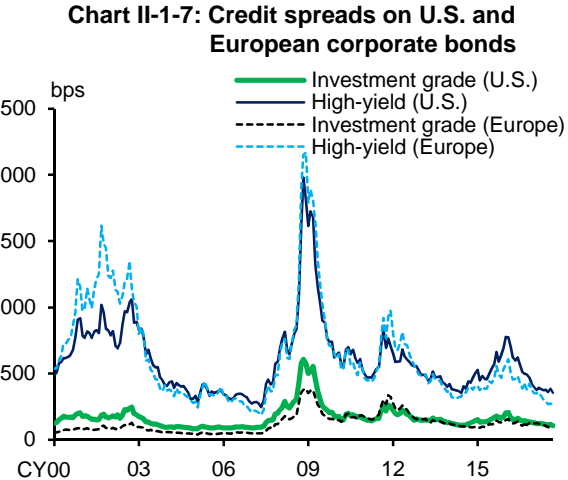
have continued to be contained, mainly due to solid corporate performance and stable inflation expectations. Under these circumstances, volatilities of various asset prices have remained at historically low levels (Chart II-1-1). Although implied volatilities (IVs) showed a temporary slight pickup several times in recent months, reflecting heightened geopolitical risks such as the situation in North Korea, historical volatilities (HVs) have continued on a declining trend, and thus the current global financial markets seem to be stable (Charts II-1-4 and II-1-5).

Rise in risky asset prices

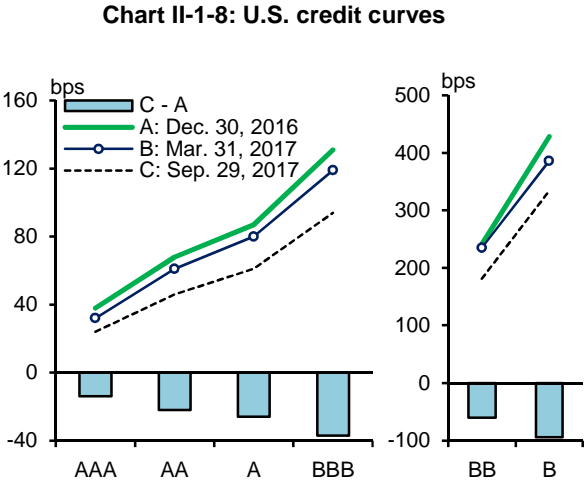
The continuation of low interest rates and low volatilities has promoted risk taking by global investors, and risky asset prices have followed a rising trend. Stock prices in the United States and Europe have hovered at around historically high levels and at recent high levels, respectively, and their valuation indicators (price earnings [P/E] ratios) have also clearly exceeded the historical average (Chart II-1-6). In the credit markets, credit spreads on corporate bonds have been stable at low levels with investors' funds having flowed into bonds, including those with low credit ratings (Chart II-1-7). In particular, credit spreads have tended to narrow significantly for corporate bonds with lower credit ratings, and this reflects the buoyant demand from investors searching for yield in absolute terms (Chart II-1-8).



Note: 1. S&P 500 for the United States; EURO STOXX for Europe; TOPIX for Japan. Latest data as at September 2017.
 2. Price earnings (P/E) ratios are calculated using expected earnings per share (EPS) for the next 12 months.
 Source: Thomson Reuters Markets.



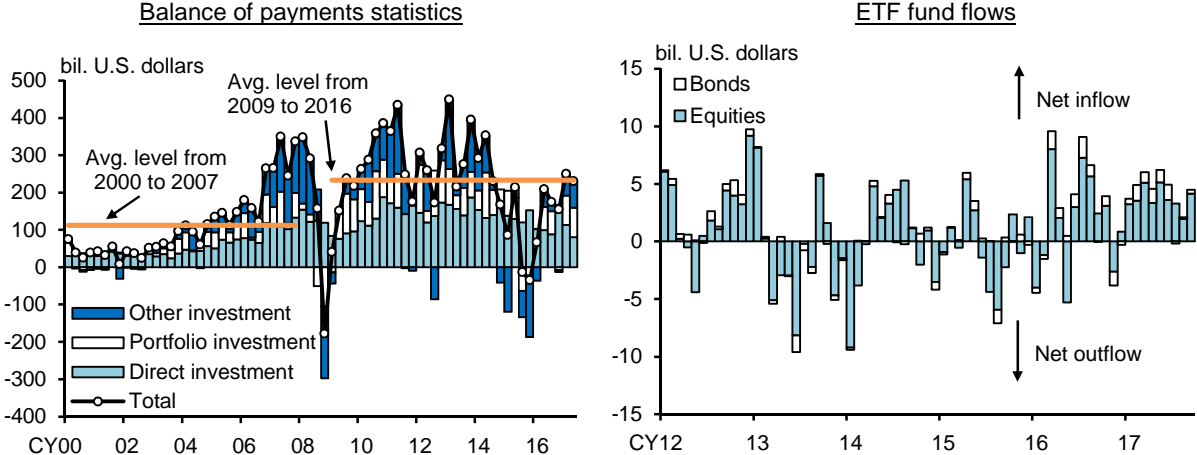
Note: Calculated by Bank of America Merrill Lynch. Latest data as at September 2017.
 Source: Bloomberg.



Note: Calculated by Bank of America Merrill Lynch.
 Source: Bloomberg.

Although emerging markets temporarily faced capital outflows amid the rise in U.S. long-term interest rates through the end of 2016, these markets have continued to register net inflows since the start of 2017, as emerging market economies have continued to recover as a whole (Chart II-1-9). Stock prices in emerging markets have risen significantly, particularly in Asia, and credit spreads on corporate bonds in these markets have also been at low levels (Chart II-1-10).

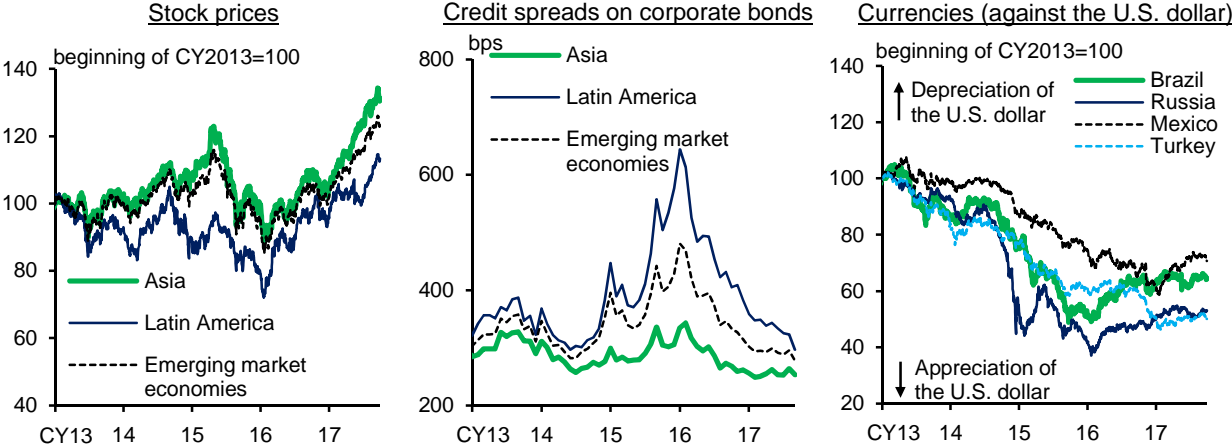
Chart II-1-9: Capital flows to emerging markets



Note: 1. In the left-hand chart, the figures are the sum of 19 major emerging market economies. Latest data as at the April-June quarter of 2017.
 2. In the right-hand chart, the figures are the fund flows of ETFs listed on the U.S. stock exchange. Latest data as at September 2017.

Source: Bloomberg; Haver Analytics.

Chart II-1-10: Developments in emerging markets



Note: 1. Stock prices are sub-indices of the MSCI Emerging Index, denominated in local currencies. Credit spreads on corporate bonds are sub-indices of the J.P. Morgan CEMBI Broad Diversified, compiled from U.S. dollar-denominated bonds.
 2. The data for stock prices in the left-hand chart and for currencies in the right-hand chart to September 29, 2017, and the latest data for credit spreads on corporate bonds in the middle chart as at September 2017.

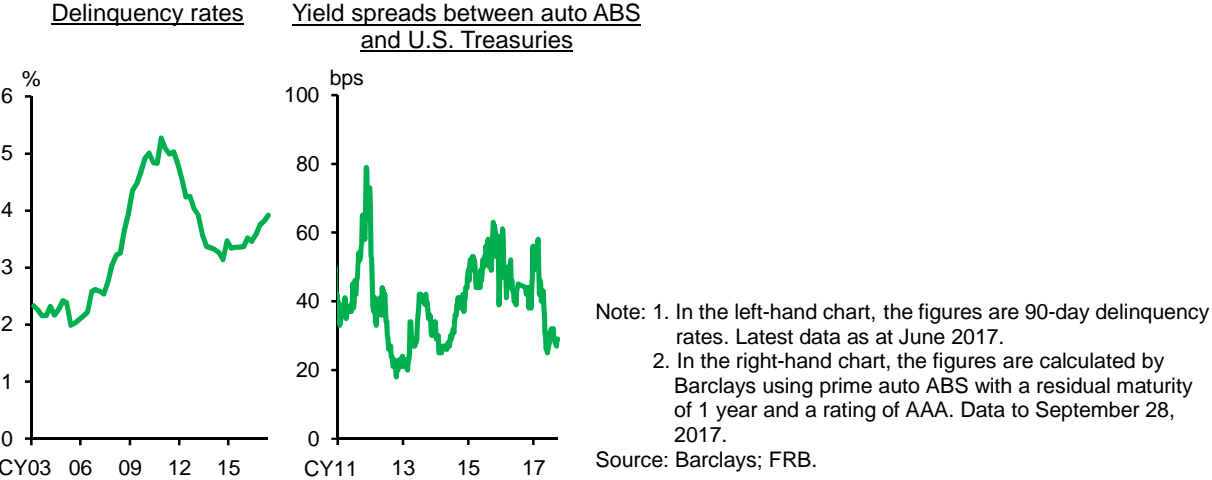
Source: Bloomberg; J.P. Morgan.

Possibility of risk repricing and a reversal of capital flows

As pointed out above, risky asset prices have generally risen during the first half of fiscal 2017; however, investors seem to be somewhat complacent in their risk perception. For example, with regard to the U.S. auto asset-backed securities (auto ABS) market -- an ABS market where the underlying assets are loans for automobile purchases -- yield spreads between auto ABS and U.S. Treasuries have narrowed, despite rising delinquency rates of the underlying loans (Chart II-1-11).

As for the stock options market, while IVs -- the expected future volatilities of stock prices for about 1 month -- have been at low levels, an indicator that captures the relative amount of risk of a substantial decline in stock prices (skew of the distribution of future stock prices) has followed an upward trend (Chart II-1-5).² Even though the tail risk of a plunge in stock prices has been a concern, a prolonged rise in stock prices tends to create a self-fulfilling feedback loop in which an increase in excess stock returns attracts more investors, thereby generating higher excess stock returns. Such a process tends to lead to some complacency in investors' risk perception.

Chart II-1-11: U.S. auto loan market



Taking such factors into account, close attention should be paid to whether global capital flows and asset prices will reverse, and thereby further affect the global financial markets as a whole. A prolonged low volatility environment could lead to excess risk-taking, i.e., an expansion in leverage and an increase in unhedged financial activities, thereby undermining financial market stability in the future. Furthermore, looking at fund flows to high dividend and low volatility funds, net inflows have been evident for a prolonged period so far (Chart II-1-12). Fund flows to these

Chart II-1-12: Fund flows to high dividend and low volatility ETFs

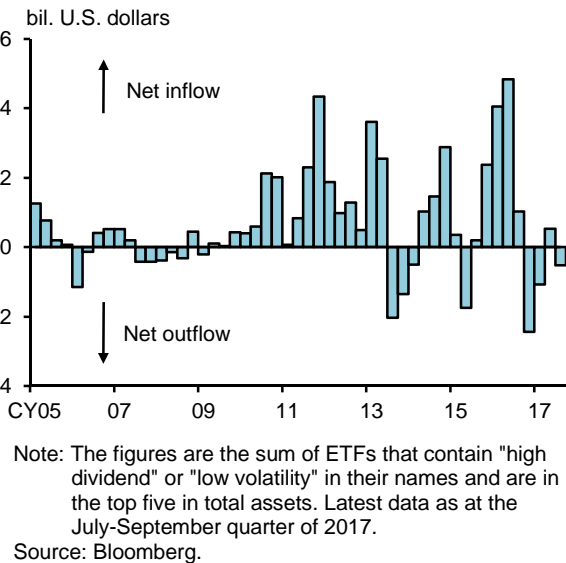
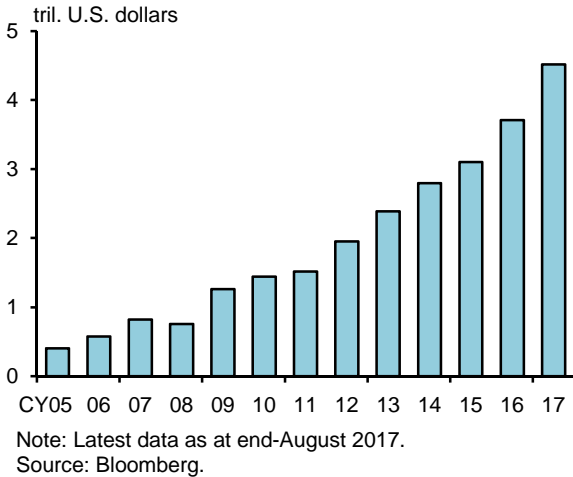


Chart II-1-13: Assets under management of ETFs



² For details, see Yoshibumi Makabe, Teppei Nagano, and Toshiyuki Sakiyama, "Expansion of Indicators of Uncertainty Calculated from Options: Tail Risk Indicators and Term Structure of Volatility," Bank of Japan Review, No. 17-J-5, April 2017 (available in Japanese only).

funds are influenced not only by fundamentals such as corporate profits, but also by developments in market interest rates and volatilities at each point in time. Therefore, they could substantially change depending on market developments.

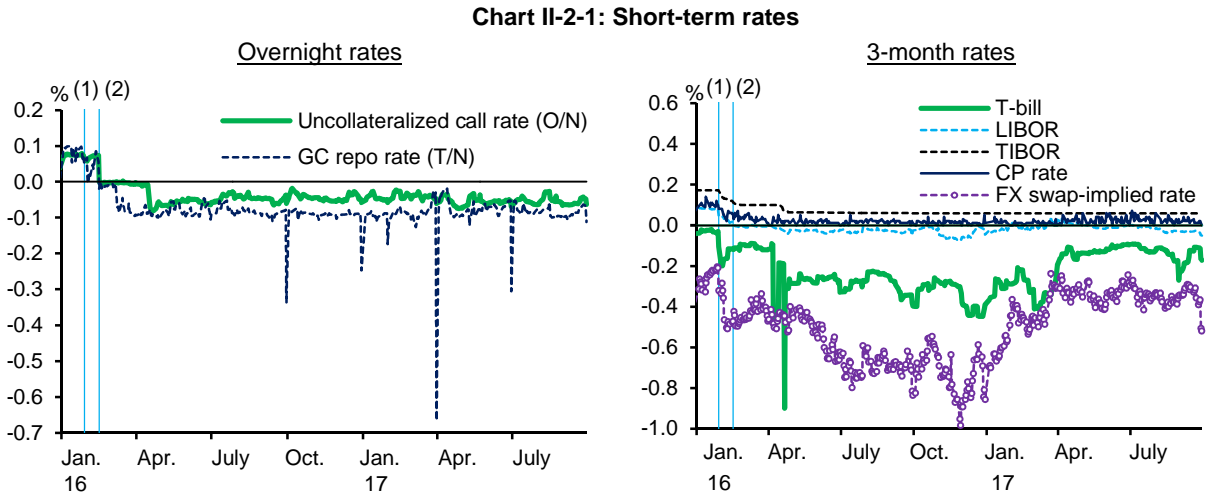
In addition, as one of the changes in capital flows that warrant attention, the growing presence of ETFs in global financial markets can be pointed out. The amount of assets under management of ETFs has increased rapidly since the global financial crisis, as ETFs have met the demand of a wide range of investors who aim at investing in passive funds at low cost (Chart II-1-13). It has been pointed out that these funds tend to increase comovement among individual stocks, since they trade all of the stocks that comprise an index rather than trading stocks individually. Recently, in the U.S. stock market, valuation indicators such as the P/E ratio have started to show overvaluation compared with past levels, and vigilance has heightened among market participants (Chart II-1-6). Careful attention should be paid to whether a decline in stock prices in a specific sector would trigger a full reversal in asset prices in the future.

B. Japanese financial markets

In Japanese financial markets, both short-term and long-term interest rates have generally been stable under Quantitative and Qualitative Monetary Easing (QQE) with Yield Curve Control. Stock prices have risen moderately, and credit spreads on corporate bonds have remained at low levels.

Money markets

Short-term interest rates -- on both overnight and term instruments -- have been in negative territory on the whole. The uncollateralized call rate (O/N) and the GC repo rate (T/N) have more or less hovered in negative territory above minus 0.5 percent. Rates on term instruments have generally remained around 0 percent or in negative territory (Chart II-2-1).

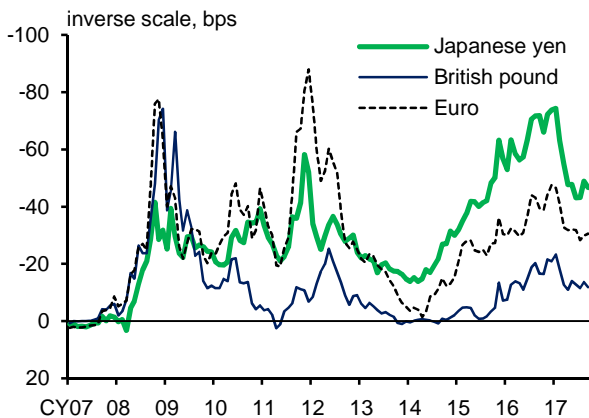


Note: 1. In the left-hand chart, the horizontal axis indicates the start dates of transactions.
 2. (1) indicates the decision to introduce QQE with a Negative Interest Rate; (2) indicates the effective start date of the negative interest rate.
 3. Data to September 29, 2017.
 Source: Bloomberg; Japan Bond Trading; JASDEC; JSDA.

A closer look indicates that yields on T-bills have risen moderately in negative territory, albeit with fluctuations. These developments reflect that (1) the Bank of Japan has gradually reduced the outstanding amount of T-bill purchases; and (2) foreign investors, who are lenders of U.S. dollars

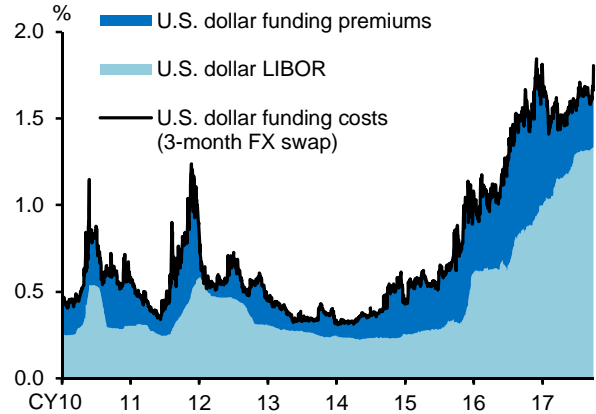
(borrowers of Japanese yen) in the FX swap markets, have reduced dollar supply (i.e., have received less yen) in response to a decline in dollar funding premiums and consequently have reduced their demand for yen-denominated safe assets (Chart II-2-1). Since the start of 2017, dollar-funding premiums have declined in the FX swap markets. This is mainly because Japanese financial institutions' dollar funding needs have declined as a growing number of them have restrained foreign bond investments. Nevertheless, as the dollar LIBOR has risen in tandem with the policy rate hikes by the FRB, dollar funding costs per se have remained at high levels (Charts II-2-2 and II-2-3).

Chart II-2-2: U.S. dollar funding premiums



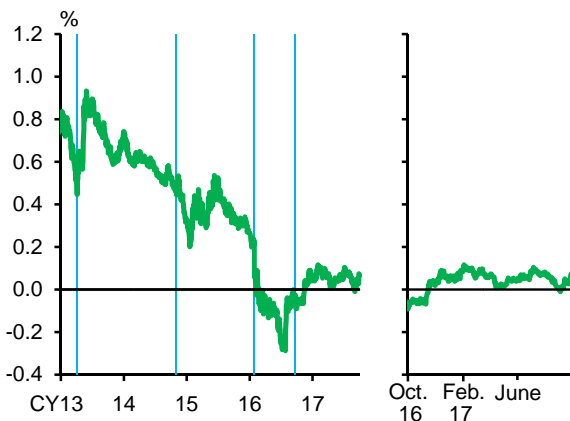
Note: 1. Monthly averages of 1-year cross-currency basis swaps.
2. Latest data as at September 2017.
Source: Bloomberg.

Chart II-2-3: Breakdown of U.S. dollar funding costs



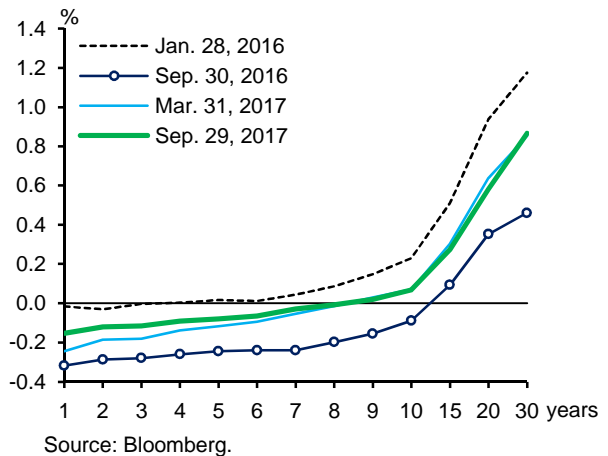
Note: 1. "U.S. dollar funding premiums" indicates the additional costs of FX swap funding on U.S. dollar LIBOR.
2. Data to September 29, 2017.
Source: Bloomberg.

Chart II-2-4: Long-term JGB yields (10-year)



Note: Data to September 29, 2017.
Source: Bloomberg.

Chart II-2-5: JGB yield curves



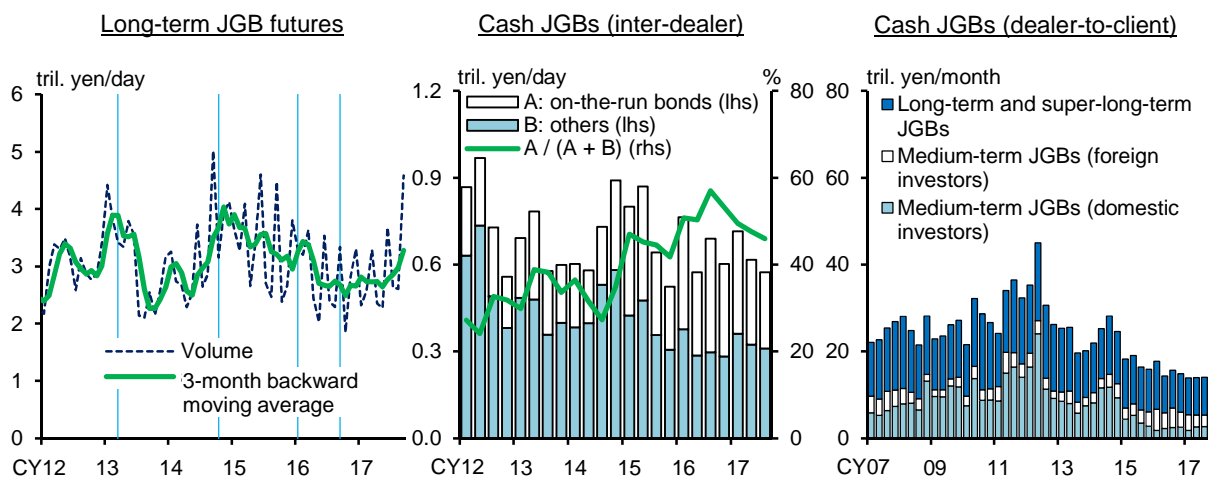
Source: Bloomberg.

Long-term JGB yields and JGB yield curve

Under QQE with Yield Curve Control, the shape of the yield curve for JGBs has been in line with the current guideline for market operations, in which the short-term policy interest rate is set at minus 0.1 percent and the target level of 10-year JGB yields is around 0 percent. Yields for relatively short maturities have hovered in negative territory above minus 0.5 percent, while 10-year JGB yields have generally been stable at around 0 percent in positive territory. 20-year JGB yields also have generally been stable in the range of 0.5-1.0 percent (Charts II-2-4 and

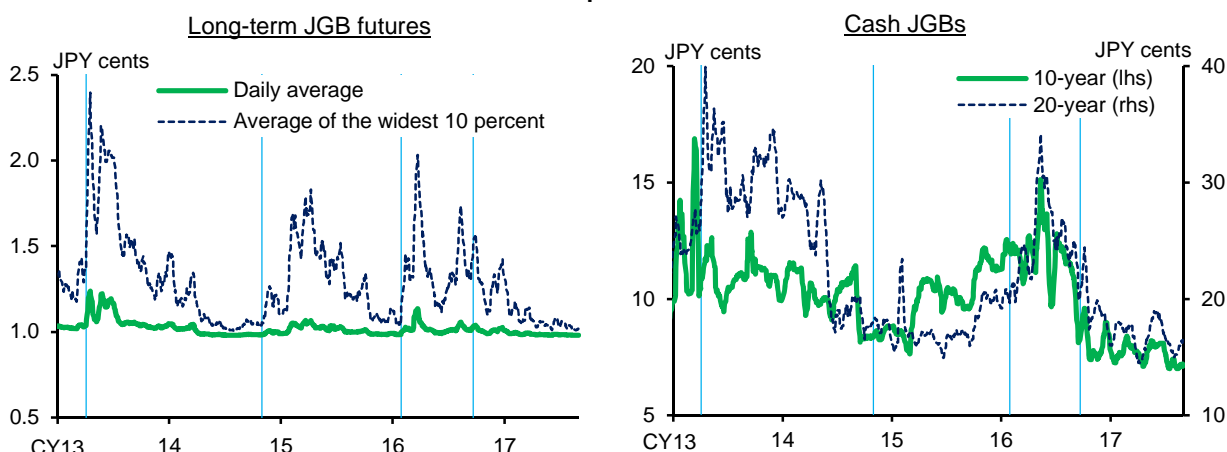
II-2-5).³

Chart II-2-6: Transaction volume in the JGB markets



Note: 1. "Cash JGBs (inter-dealer)" shows the trading volume via the Japan Bond Trading. "Cash JGBs (dealer-to-client)" shows the gross amount purchased by clients excluding governments, the BOJ, etc.
 2. The latest data for long-term JGB futures in the left-hand chart as at September 2017, those for cash JGBs (inter-dealer) in the middle chart as at the July-September quarter of 2017, and those for cash JGBs (dealer-to-client) in the right-hand chart as at July-August 2017.
 Source: JSDA; Osaka Exchange; QUICK.

Chart II-2-7: Bid-ask spreads in the JGB markets



Note: 1. In the left-hand chart, the figures are calculated by using the bid-ask spread data with a 1-minute frequency. "Average of the widest 10 percent" is calculated by extracting the widest 10 percent of data (with a 1-minute frequency) for each business day and taking the average thereof. 10-day backward moving averages.
 2. Data to August 31, 2017.
 Source: Nikkei NEEDS; Thomson Reuters Markets.

Liquidity and functioning of the JGB markets

Liquidity in the JGB markets has shown signs of both deterioration and improvement.⁴ Transaction volume for long-term JGB futures and inter-dealer transaction volume for cash JGBs followed a declining trend, and have fluctuated at low levels thereafter. Dealer-to-client transaction volume for

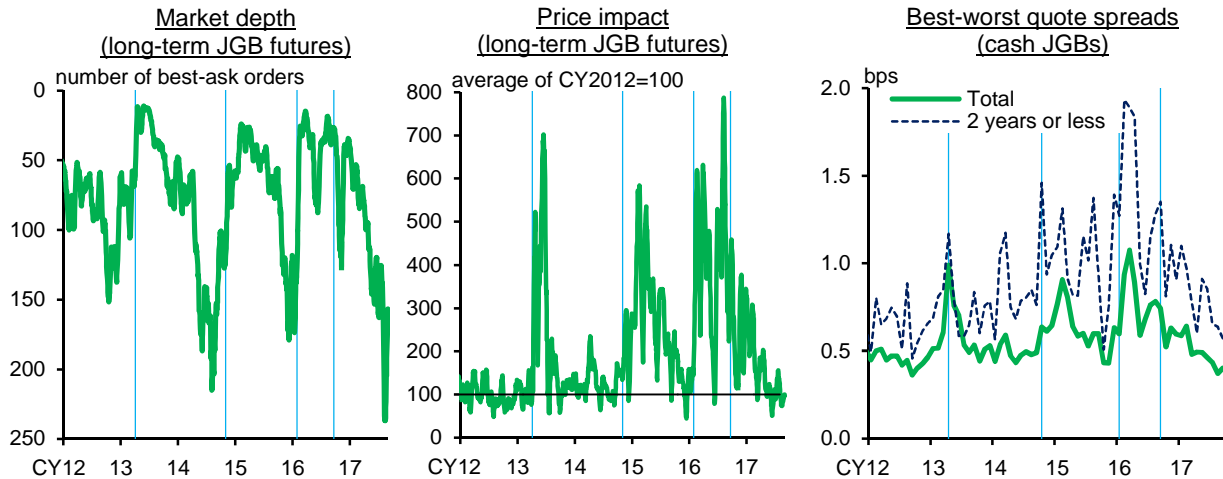
³ In this section, the vertical lines in the charts indicate the introduction of QE (April 4, 2013), the expansion of QE (October 31, 2014), the decision to introduce QE with a Negative Interest Rate (January 29, 2016), and the introduction of QE with Yield Curve Control (September 21, 2016).

⁴ The Financial Markets Department of the Bank of Japan updates and releases liquidity indicators of the JGB markets, generally on a quarterly basis (<https://www.boj.or.jp/en/paym/bond/index.htm/#p02>).

cash JGBs has continued on a declining trend (Chart II-2-6). On the other hand, bid-ask spreads have been trending narrower, as price ranges have become narrower, and some signs of improvement have been observed in indicators of both market depth and resiliency (Charts II-2-7 and II-2-8).

Meanwhile, the results of the *Bond Market Survey* indicate that many market participants continue to mention the poor functioning of the JGB markets (Chart II-2-9). It is necessary to continue to closely monitor liquidity in the JGB markets from a multi-dimensional perspective.

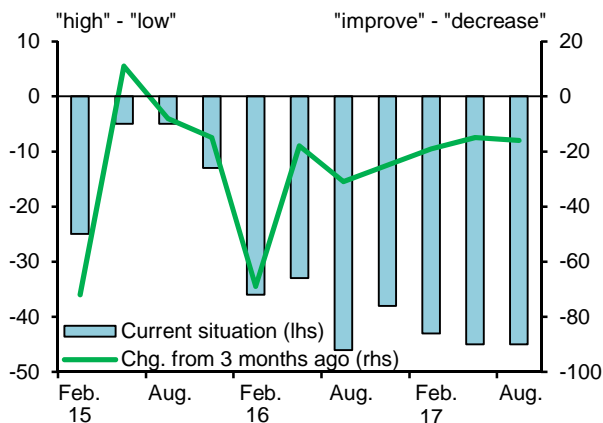
Chart II-2-8: Market depth and resiliency in the JGB markets



Note: 1. In the left-hand chart, the figures are calculated by taking the median of the number of orders at the best-ask price with a 1-minute frequency for each business day. 10-day backward moving averages. Data to August 31, 2017.
 2. In the middle chart, price impact is an estimation of how much impact a unit volume of transactions has on price changes. 10-day backward moving averages. Data to August 31, 2017.
 3. In the right-hand chart, a small portion of transactions with spreads of more than 10 bps is excluded from the calculation. Latest data as at September 2017.

Source: Nikkei NEEDS; Yensai.com.

Chart II-2-9: Bond market survey



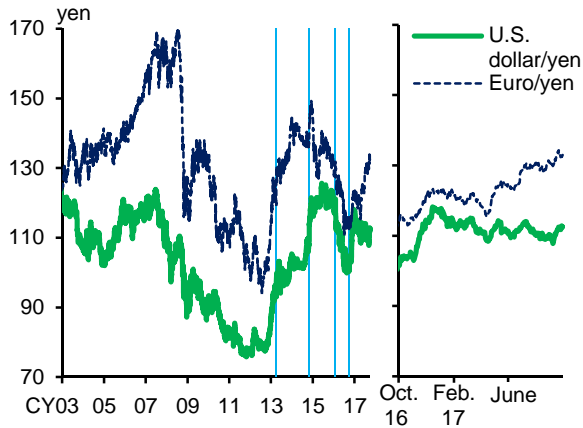
Note: 1. The figures indicate the DIs for the degree of bond market functioning from the surveyed institutions' viewpoint, based on the proportion of responding institutions selecting each given choice.
 2. The latest survey was conducted from August 8-17, 2017.

Source: BOJ, "Bond market survey."

Foreign exchange markets and credit and stock markets

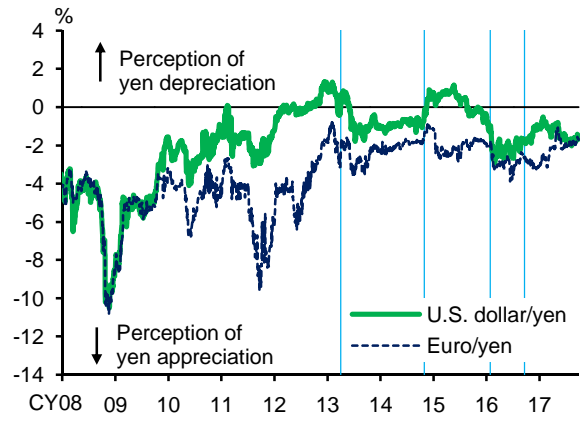
With regard to foreign exchange rates, the yen has depreciated against the euro, reflecting the abatement of uncertainties regarding political situations in Europe and speculation about a reduction in monetary accommodation by the ECB (Chart II-2-10). On the other hand, the yen has been more or less unchanged against the U.S. dollar. Looking at risk reversals, it seems that market participants' vigilance over the yen's appreciation against the U.S. dollar has heightened somewhat recently amid uncertainties over the political situation in the United States (Chart II-2-11).

Chart II-2-10: FX rates



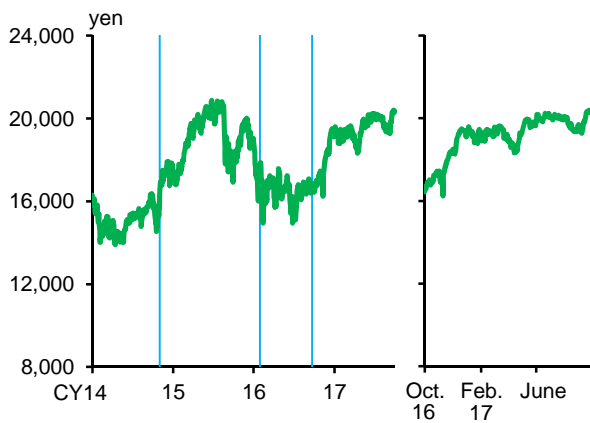
Note: Data to September 29, 2017.
Source: Bloomberg.

Chart II-2-11: Risk reversals



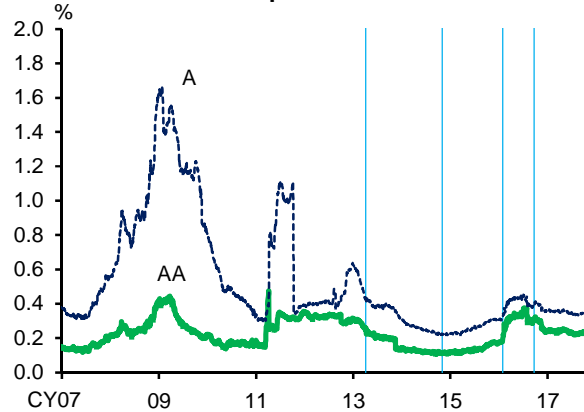
Note: 1-year risk reversals. Data to September 29, 2017.
Source: Bloomberg.

Chart II-2-12: Stock prices (Nikkei 225)



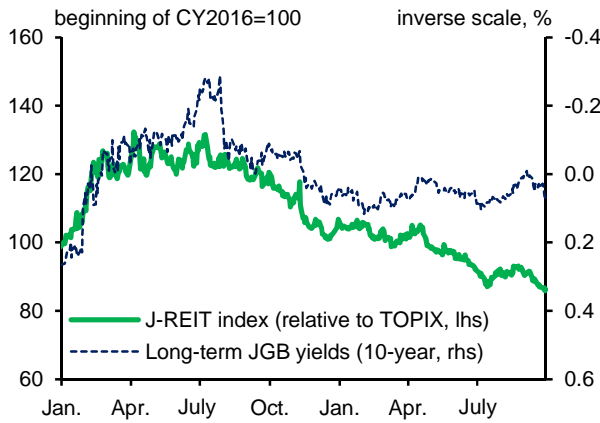
Note: Data to September 29, 2017.
Source: Bloomberg.

Chart II-2-13: Yield spreads between corporate bonds and JGBs



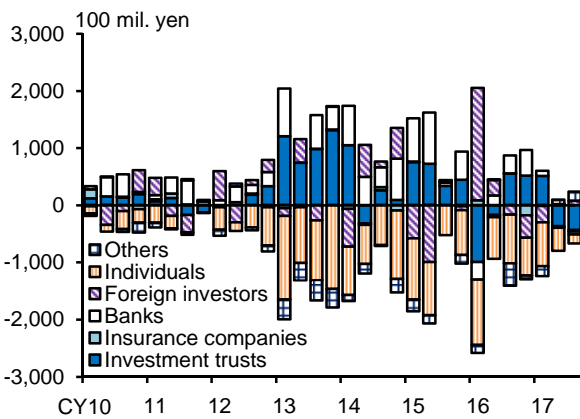
Note: 1. Average yield spreads of bonds with a residual maturity of 3 years or more but less than 7 years. Rated by R&I.
2. Data to September 29, 2017.
Source: JSDA.

Chart II-2-14: J-REIT index and long-term JGB yields



Note: Data to September 29, 2017.
Source: Bloomberg.

Chart II-2-15: Trading volume of J-REITs by investor type



Note: Latest data as at July-August 2017 (converted into quarterly amounts).
Source: Tokyo Stock Exchange.

Under these circumstances, Japanese stock prices have risen moderately, and the Nikkei 225 Stock Average has recovered to the 20,000 yen level for the first time since the middle of 2015

(Chart II-2-12). The reason that stock prices have risen despite the recent appreciation of the yen against the U.S. dollar compared to the middle of 2015 seems to be that market participants have positively evaluated the improvement in Japanese firms' profitability. Given the recent stability of Japanese P/E ratios, it can be assessed that stock prices have risen in line with the expected improvement in corporate profits (Chart II-1-6). Credit spreads on corporate bonds have also been stable at low levels on the whole (Chart II-2-13).

Meanwhile, the J-REIT index had generally comoved with long-term interest rates, rising when long-term interest rates had declined. However, the index has been relatively weak since April 2017, partly as net purchases by investment trusts (monthly-distribution-type) -- which had been observed until then -- have turned to net sales (Charts II-2-14 and II-2-15).

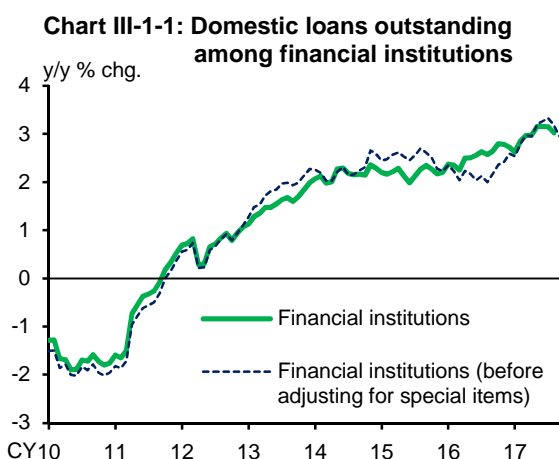
III. Examination of financial intermediation

This chapter examines the developments in financial intermediation, based mainly on the financial information for the first half of fiscal 2017. First, we outline the developments in financial intermediation by financial institutions, such as banks and *shinkin* banks, investment activities by institutional investors, and households' investment in financial assets. Then, we assess the state of financial intermediation through financial markets. In the last part of this chapter, we examine whether imbalances in these activities can be observed.

A. Financial intermediation by financial institutions

1. Domestic loans

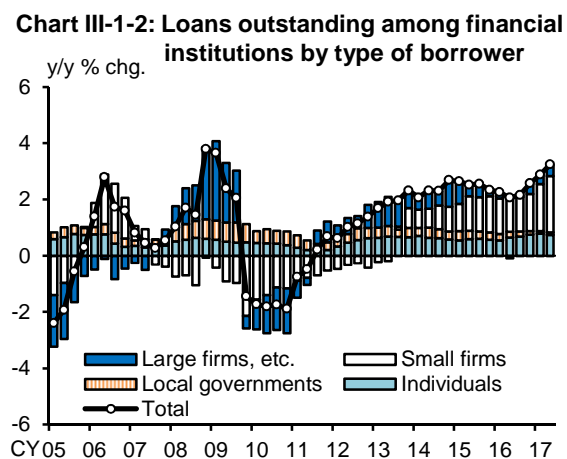
Financial institutions' domestic loans outstanding have been growing at a moderately faster pace on a year-on-year basis, recently at around 3 percent (Charts III-1-1 and III-1-2). Financial institutions' lending stances have remained active, and demand for funds, especially by small firms, has been increasing (Charts III-1-3 and III-1-4).



Note: 1. The latest data for loans outstanding among financial institutions as at August 2017. The latest data for those before adjusting for special items as at September 2017.

2. "Financial institutions" indicates the outstanding amount after adjusting bank loans for special items, which are composed of exchange rate changes, loan write-offs and related items, and securitization of loans.

Source: BOJ, "Principal figures of financial institutions."



Note: Latest data as at end-June 2017. Overseas yen loans and domestic loans transferred overseas are excluded.

Source: BOJ.

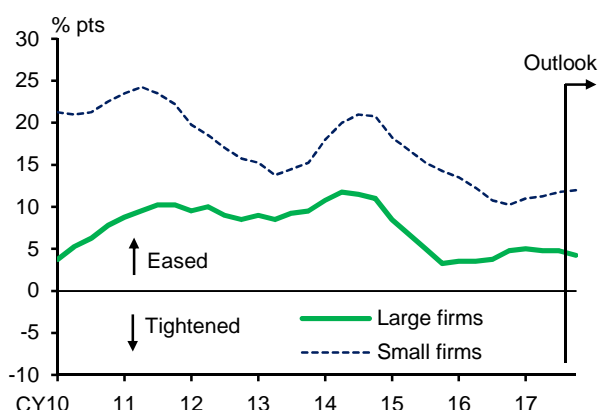
Developments in loans by type of borrower

Looking at loans by type of borrower, while growth in financial institutions' loans to local governments, which have thin profit margins, has slowed, loans to firms and individuals have continued to grow (Chart III-1-2).

In terms of loans to firms by firm size, loans to large firms have continued to increase (Chart III-1-2).⁵ Specifically, demand for funds related to merger and acquisition (M&A) deals, etc. has

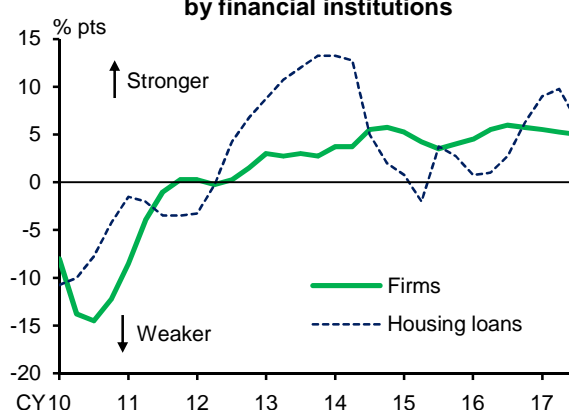
⁵ In Chart III-1-2, part of the loans to holding companies of large firms, including for M&A financing, are included in loans to small firms. In the statistics, these holding companies are treated as small firms because they, for example,

Chart III-1-3: DI of credit standards



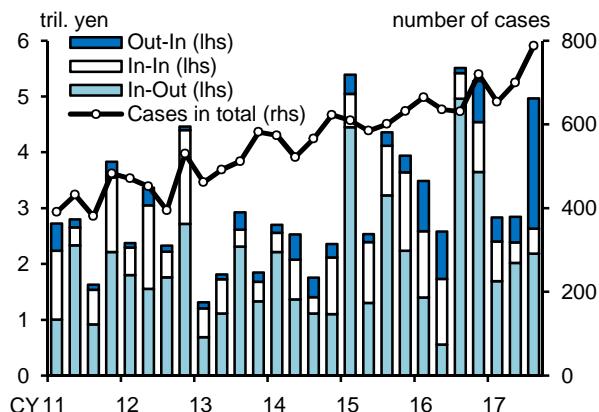
Note: 1. Latest data as at July 2017.
 2. Based on the proportion of responding financial institutions selecting each given choice, the DI is calculated as follows:
 $DI = \text{"considerably eased"} + 0.5 * \text{"somewhat eased"} - 0.5 * \text{"somewhat tightened"} - \text{"considerably tightened."}$
 3. 4-quarter backward moving averages.
 Source: BOJ, "Senior loan officer opinion survey on bank lending practices at large Japanese banks."

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



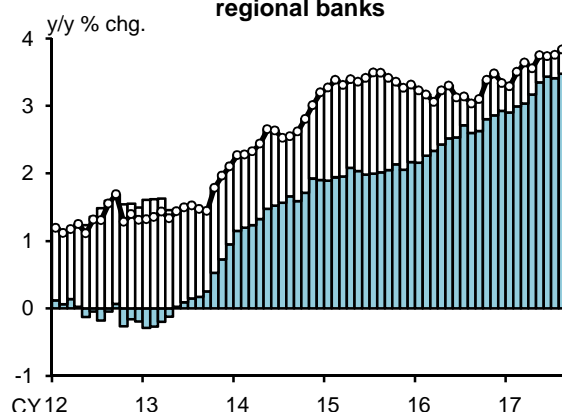
Note: 1. Latest data as at July 2017.
 2. Based on the proportion of responding financial institutions selecting each given choice, the DI is calculated as follows:
 $DI = \text{"substantially stronger"} + 0.5 * \text{"moderately stronger"} - 0.5 * \text{"moderately weaker"} - \text{"substantially weaker."}$
 3. 4-quarter backward moving averages.
 Source: BOJ, "Senior loan officer opinion survey on bank lending practices at large Japanese banks."

Chart III-1-5: M&A related to Japanese companies



Note: 1. Latest data as at the July-September quarter of 2017.
 2. "In-Out" means the acquirer is a Japanese company and the target company is a foreign company. "In-In" means the acquirer is a Japanese company and the target company is a Japanese company. "Out-In" means the acquirer is a foreign company and the target company is a Japanese company.
 Source: RECOF.

Chart III-1-6: Corporate loans provided by regional banks



Note: 1. Latest data as at September 2017.
 2. Figures in parentheses indicate the amounts outstanding as at September 2017.
 Source: BOJ.

continued to contribute to the increase, and the yen value of foreign currency-denominated loans (foreign currency-denominated impact loans) has recently increased reflecting the depreciation of the yen. M&A activity by Japanese firms, especially cross-border M&As -- targeting foreign companies (In-Out) -- has continued to be brisk (Chart III-1-5). Banks, especially major banks -- partly with a view to improving their non-interest income (fees and commissions related to domestic and foreign exchange transactions and syndicated loans, etc.) -- have been willing to enhance their lending business, which may become a source of non-interest income. In addition,

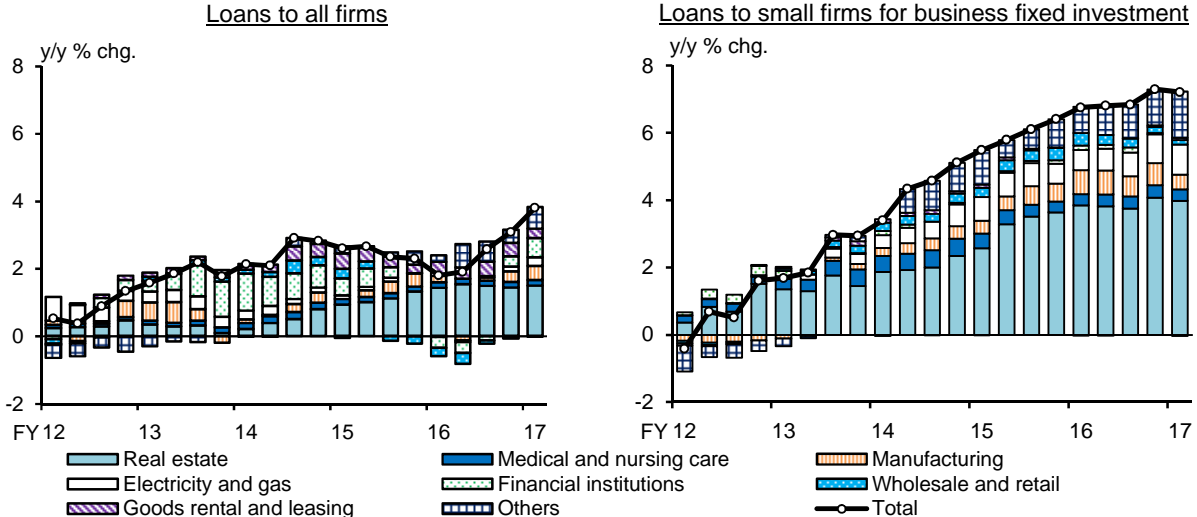
only have a small number of regular employees.

banks have put a special emphasis on subordinated loans (hybrid financing that helps firms to improve their financial conditions), which offer relatively wider profit margins.

Loans to small firms -- for both business fixed investment and working capital -- have continued to increase, and the growth rate has been accelerating (Chart III-1-2). Financial institutions have been willing to extend loans to local small firms, including borrowers with lower credit ratings, and have been continuing to support, for example, start-up firms, business revitalization, business succession, and firms' business matching. Regional financial institutions in particular have continued to make efforts to revitalize local economies and firms with a view to maintaining and buttressing their own business bases (Chart III-1-6). Meanwhile, they have held back from extending loans from their branches in Tokyo, including thin-margin syndicated loans to large firms.

In terms of loans to firms by industry, loans to a large number of industries have been increasing (Chart III-1-7). While real estate loans continue to make a large contribution, loans to many other industries such as medical and nursing care, manufacturing, electricity and gas, financial institutions (including non-bank lending businesses), goods rental and leasing, and information and communications, which are included in "others," have also been increasing.⁶ A breakdown of loans to small firms for business fixed investment also shows an increase in loans to a wide range of industries.

Chart III-1-7: Banks' corporate loans outstanding by industry



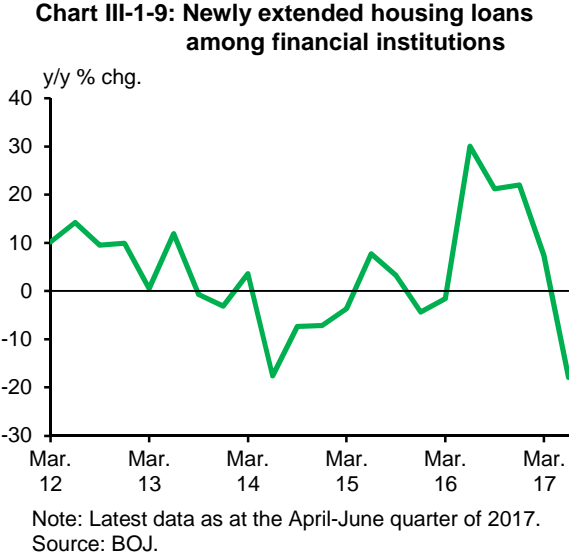
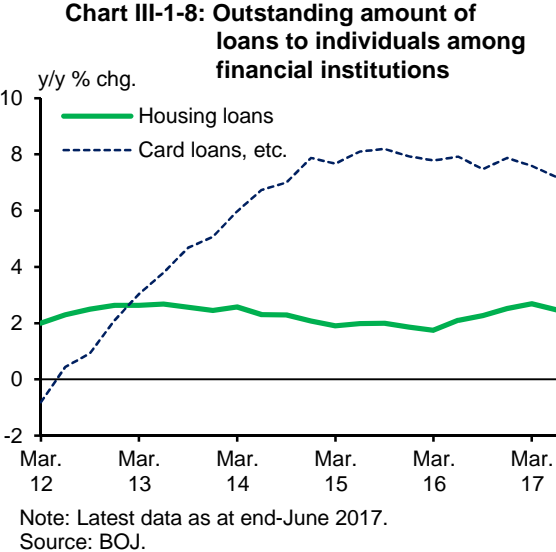
Note: Latest data as at end-June 2017. Overseas yen loans and domestic loans transferred overseas are excluded.
Source: BOJ.

Next, in terms of loans to individuals, the outstanding amount of housing loans has continued to grow at a year-on-year rate in the range of 2.0-3.0 percent (Chart III-1-8). As refinancing, which increased sharply after the decision in January 2016 to introduce QQE with a Negative Interest Rate, has run its course, the year-on-year rate of change in newly extended housing loans has turned negative (Chart III-1-9).⁷ The outstanding amount of card loans, which offer relatively wide

⁶ It appears that the increase in lending for renewable energy generation facilities, such as solar power generation facilities, contributed to the increase in lending for electricity and gas among lending to small firms for business fixed investment as a result of the implementation of the Feed-in Tariff Scheme for Renewable Energy.

⁷ Loan refinancing by another bank is treated as a new loan. Meanwhile, unless refinancing results in a change in the amount borrowed, it does not affect the outstanding amount of housing loans among financial institutions overall. It should therefore be noted that changes in newly extended housing loans do not necessarily mean changes in the outstanding amount of housing loans.

profit margins, has maintained a relatively high growth rate (Chart III-1-8). However, the share of card loans in the outstanding amount of loans to individuals is 3 percent at present (end-June 2017) and hence small compared to housing loans (90 percent share).



Developments in real estate loans

While loans to the real estate industry have continued to grow at a faster pace than loans to all industries, the pace of growth has recently decelerated somewhat (Chart III-1-10). Looking at regional financial institutions' real estate loans by region, the year-on-year rate of change in newly extended loans, which had been particularly high in the three major metropolitan areas (the Southern Kanto, Tokai, and Kinki regions) and Kyushu, has turned negative, and the growth in the outstanding balance of real estate loans has also decelerated somewhat (Charts III-1-11 and III-1-12). The outstanding amount of real estate loans extended by domestic banks and *shinkin* banks as at end-June 2017 reached a record high level of around 88 trillion yen. However, there is a growing awareness of risks associated with adjustments in the real estate market and credit concentration in the real estate industry, and some banks are becoming more prudent in their lending.

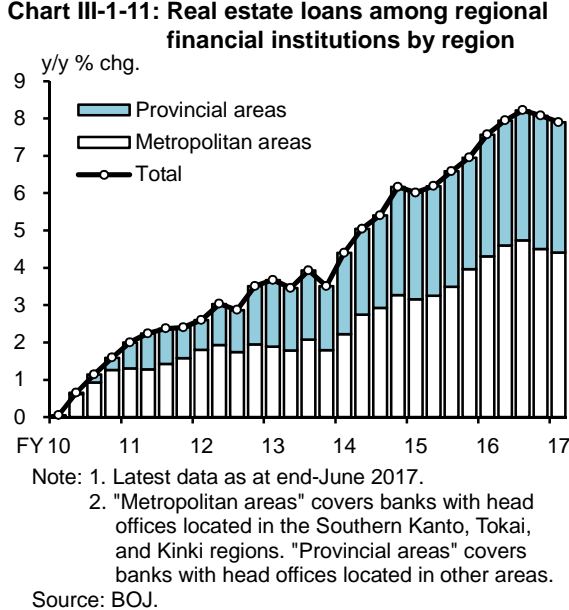
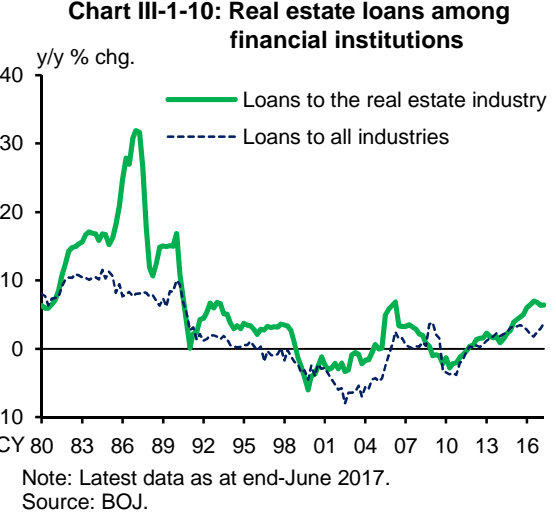
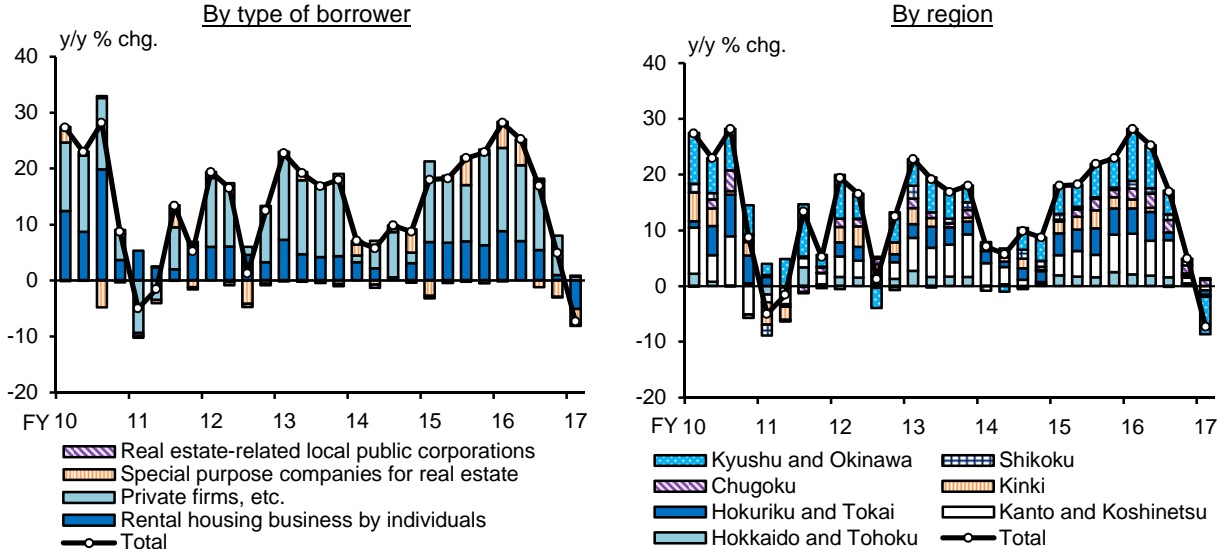
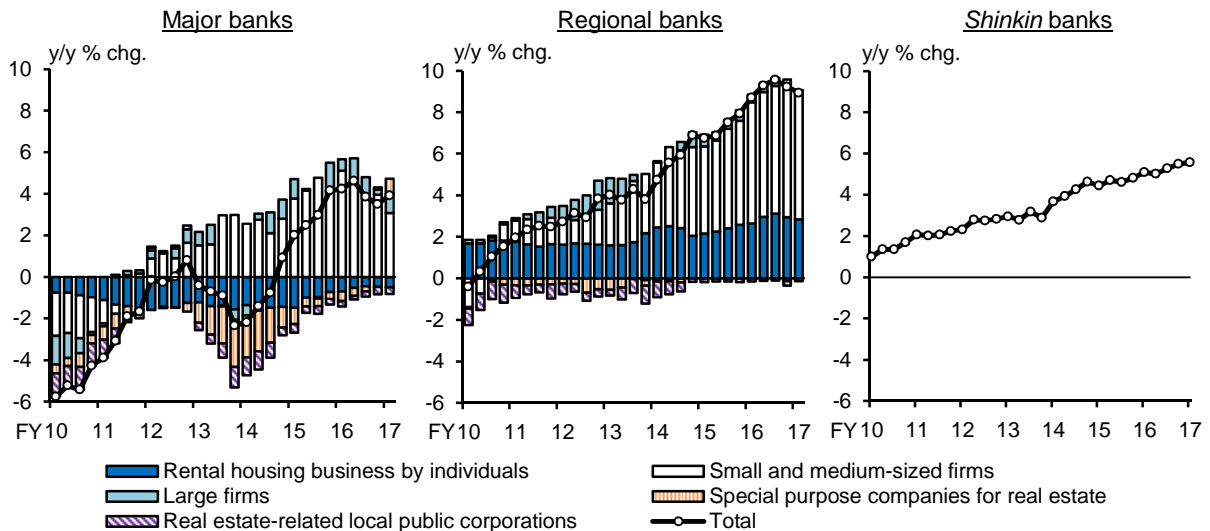


Chart III-1-12: Newly extended real estate loans for fixed investment among regional banks



Note: 1. Latest data as at the April-June quarter of 2017.
 2. In the right-hand chart, the region is based on the location of the banks' head offices.
 Source: BOJ.

Chart III-1-13: Breakdown of real estate loans



Note: Latest data as at end-June 2017.
 Source: BOJ.

By type of bank, the year-on-year growth rate of major banks' real estate loans, after accelerating in fiscal 2015, has remained at around 4 percent since fiscal 2016 (Chart III-1-13). The increase in loans by major banks is concentrated in loans to real estate investment trusts (REITs), which drive demand in the commercial real estate market.⁸ The outstanding amount of real estate loans among regional financial institutions has continued to grow at a faster pace than that of major banks, driven by increasing demand to build rental properties as a way to reduce inheritance tax burden and to invest in income-producing properties. However, the year-on-year rate of change in new loans to rental housing businesses by individuals has recently turned negative, while the growth rate of new loans to small and medium-sized firms including asset management companies founded by individuals and local real estate agents has rapidly declined (Chart III-1-12). Reasons for these developments include (1) the slackening of the rental housing market as

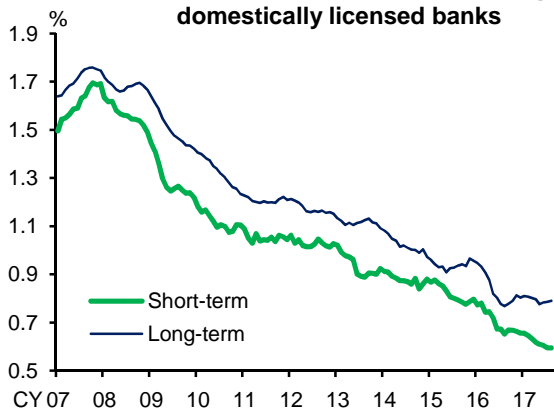
⁸ In Chart III-1-13, REITs are included in small and medium-sized firms.

indicated by increases in vacancy rates in some areas, (2) the decline in the number of investment properties in favorable locations promising profits, and (3) the fact that some financial institutions are more aware of the risks associated with adjustments in the real estate market and credit concentration in the real estate industry, and are thus becoming more prudent in their lending.

Developments in loan and deposit interest rates

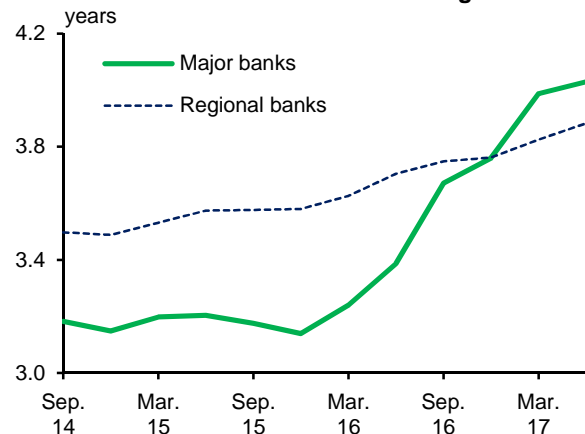
Financial institutions' average contract interest rates on new loans and discounts are hovering around historically low levels (Chart III-1-14). By loan maturity, interest rates on short-term loans have continued their moderate downward trend. Interest rates on long-term loans have remained more or less unchanged since the fall of 2016. While competition among financial institutions and the improvement in firms' financial conditions have exerted downward pressure on interest rates on long-term loans, a shift toward fixed-rate loans with longer lending periods is one of the factors that have put upward pressure on interest rates (Chart III-1-15). Interest rates on

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



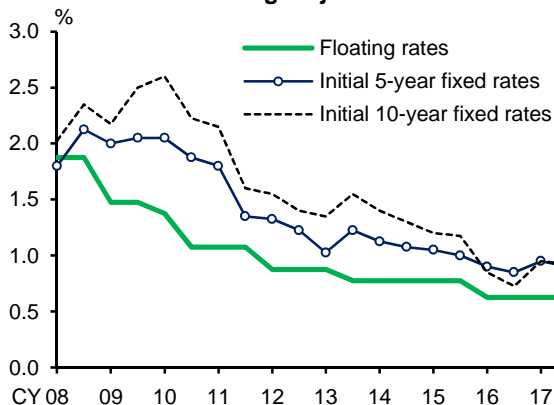
Note: Latest data as at August 2017. 6-month backward moving averages.
Source: BOJ, "Average contract interest rates on loans and discounts."

Chart III-1-15: Average remaining maturity of fixed-rate loans among banks



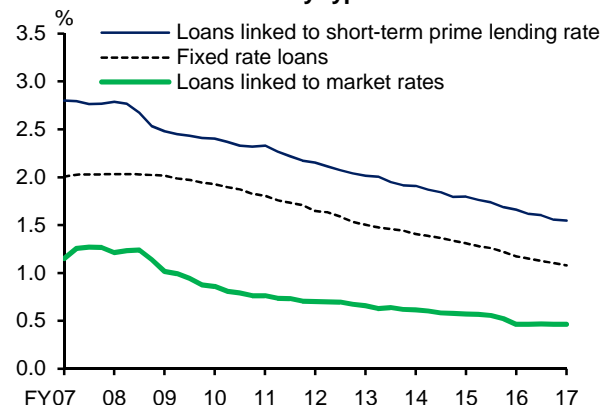
Note: 1. Latest data as at end-June 2017.
2. The data are estimated based on the outstanding amount at month-end.
Source: BOJ.

Chart III-1-16: Interest rates on housing loans among major banks



Note: 1. Covers Mizuho Bank, The Bank of Tokyo-Mitsubishi UFJ, Sumitomo Mitsui Banking Corporation, Resona Bank, Saitama Resona Bank, and Sumitomo Mitsui Trust Bank. The data are based on April and October figures for each year.
2. Interest rates are the median of preferential rates.
3. Latest data as at October 2017.
Source: "Nikkin report"; Published accounts of each bank.

Chart III-1-17: Lending rates among regional banks by type of interest rate

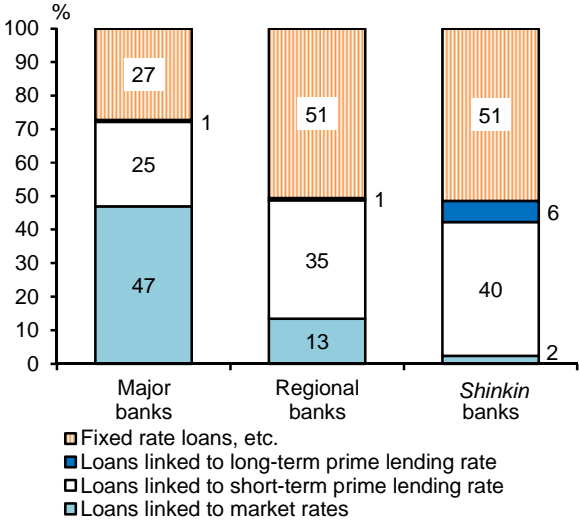


Note: 1. Latest data as at end-June 2017.
2. The lending rates are the median of the interest rates on outstanding loans among regional banks.
Source: BOJ.

housing loans are also hovering at low levels (Chart III-1-16).

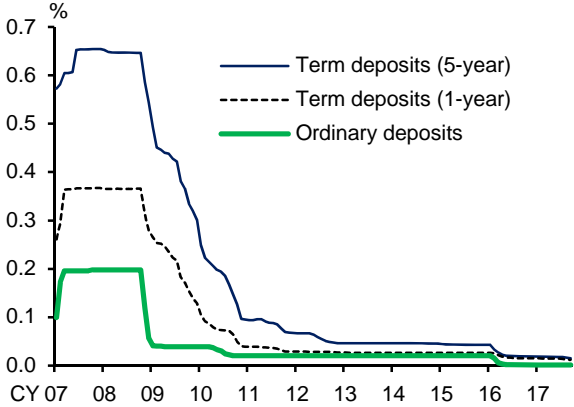
Looking at loan interest rates by type, interest rates on loans linked to market rates and subject to interest rate renewal every few months are hovering at low levels (Chart III-1-17). This reflects the fact that reference rates such as TIBOR have been flat recently after declining following the introduction of the negative interest rate policy. Meanwhile, interest rates for loans linked to short-term prime lending rates and fixed-rate loans, which make up a relatively large share of regional financial institutions' loan portfolios, have continued on a declining trend under continuing monetary easing (Chart III-1-18). This also reflects the effects of competition among financial institutions. Interest rates on these loans will remain affected by the decline in interest rates at the time of rollover, as the average remaining lending term on these loans tends to be about 3-4 years.

Chart III-1-18: Composition of loans by type of interest rate



Note: 1. Data as at end-June 2017.
 2. Loans linked to market rates are loans that are linked to rates such as TIBOR.
 Source: BOJ.

Chart III-1-19: Interest rates on deposits



Note: Interest rates on term deposits are simple averages posted at financial institutions. Latest data as at September 25, 2017.
 Source: BOJ.

Interest rates on deposits (term deposits and ordinary deposits) have remained at extremely low levels (Chart III-1-19). At both major banks and regional banks, interest rates on ordinary deposits have been hovering at close to 0 percent.

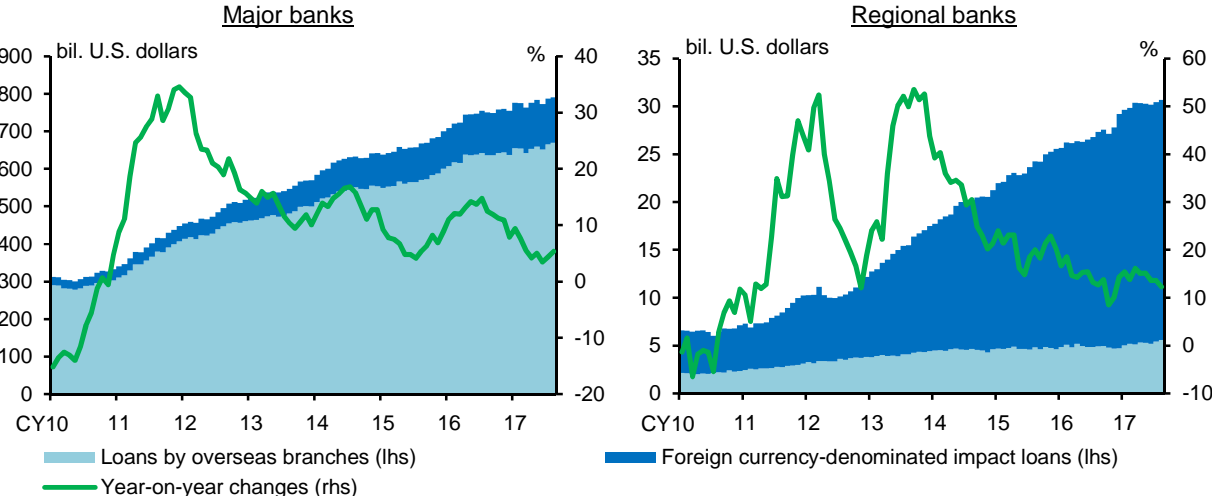
2. Overseas loans

Banks' overseas loans have continued to grow, but the pace of growth has tended to slow as banks are increasing efforts to more rigorously assess the profitability of such loans against the backdrop of an increase in the cost of foreign currency funding (Chart III-1-20). Looking at major banks' lending by region, growth in loans to North America, which had been relatively strong, has slowed, while that in loans to Asia has stagnated due to competition with local and other foreign banks (Chart III-1-21). Under these circumstances, Japanese banks' share in overall foreign claims is more or less unchanged (Chart III-1-22).

While maintaining a proactive stance with regard to overseas business on the whole, banks have recently taken a more cautious stance in their initial assessment of loans in terms of their profitability and borrowers' creditworthiness and have been strengthening efforts to focus on non-interest income. Banks have been expanding lending businesses for overseas firms, with a view toward supporting the global expansion of Japanese firms and establishing a

more solid global business base through satisfying financial needs in countries with high long-term growth potential. However, with foreign currency funding costs rising and competition for prime borrowers intensifying, banks have been increasing efforts to more rigorously assess the loan profitability (Chart II-2-3). Under these circumstances, the shrinkage of lending margins has come to a pause (Chart III-1-23). Moreover, in view of the recent experiences of a slowdown in emerging market economies and decline in commodity prices, banks remain cautious in their initial and interim assessments of borrowers' creditworthiness. Furthermore, in order to improve their overall profitability, including income accruing from non-lending businesses, major banks are placing even more emphasis on deepening their relationships with clients and increasing their fee and commission-based income by, for example, engaging in closer cooperation with firms belonging to the same financial group, such as securities companies (Chart III-1-24).

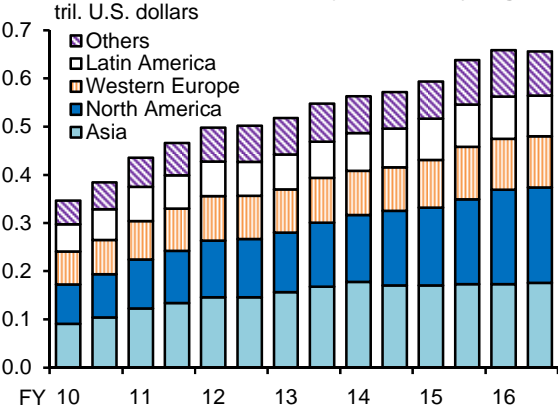
Chart III-1-20: Banks' foreign currency-denominated loans and loans by overseas branches



- Note: 1. Latest data as at end-August 2017.
 2. "Loans by overseas branches" includes foreign currency-denominated impact loans in accounts held by overseas branches.
 3. "Foreign currency-denominated impact loans" indicates banks' foreign currency-denominated loans for residents.
 4. "Year-on-year changes" represents the growth rate of the sum of "Loans by overseas branches" and "Foreign currency-denominated impact loans."

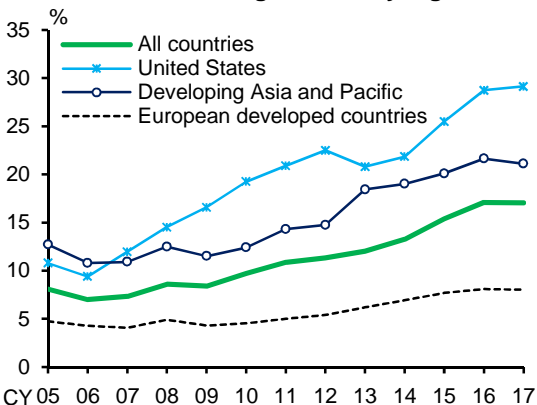
Source: BOJ.

Chart III-1-21: Overseas loans outstanding of the three major banks by region



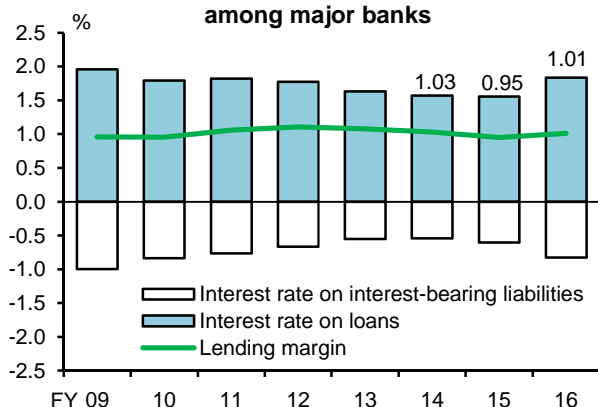
Note: Latest data as at end-March 2017.
 Source: Published accounts of each bank.

Chart III-1-22: Share of Japanese banks in foreign claims by region



- Note: 1. The data are based on end-December figures for each year. Latest data as at end-March 2017.
 2. Covers foreign claims in the non-bank private sector (on an ultimate risk basis).
 Source: BIS, "Consolidated banking statistics"; BOJ, "The results of BIS international consolidated banking statistics in Japan."

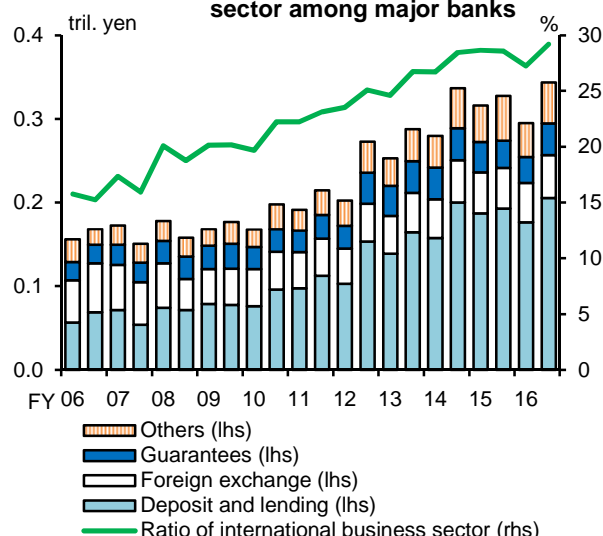
Chart III-1-23: Lending margin in the international business sector among major banks



Note: The cost of interest rate swaps is subtracted from the funding costs when calculating the lending margin.

Source: BOJ.

Chart III-1-24: Fee and commission income in the international business sector among major banks



Note: 1. Latest data as at the second half of fiscal 2016.

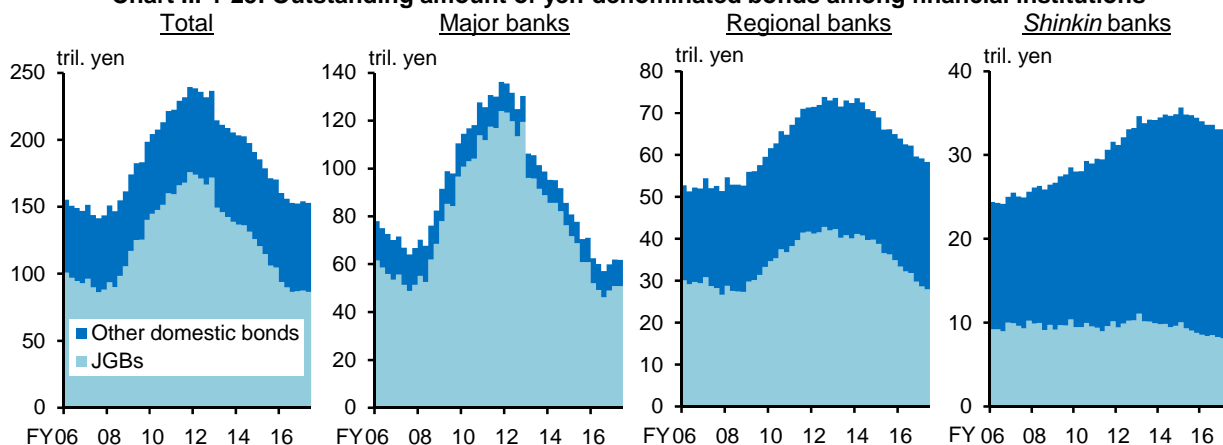
2. "Ratio of international business sector" is the ratio of fee and commission income of the international business sector to that of all sectors.

Source: BOJ.

3. Securities investment

The outstanding amount of financial institutions' yen-denominated bond investment has been on a declining trend reflecting the continued large-scale JGB purchases by the Bank of Japan, but the pace of decline has recently been moderate. The outstanding amount of their foreign bond investment decreased following the rise in U.S. interest rates toward the end of 2016, but most recently has been increasing again somewhat. The outstanding amount of financial institutions' investment trusts has been on an upward trend, and financial institutions have maintained their stance of active risk taking in securities.

Chart III-1-25: Outstanding amount of yen-denominated bonds among financial institutions



Note: 1. Latest data as at end-August 2017.

2. The data are the sum of figures for domestic and overseas branches, based on the outstanding amount at month-end.

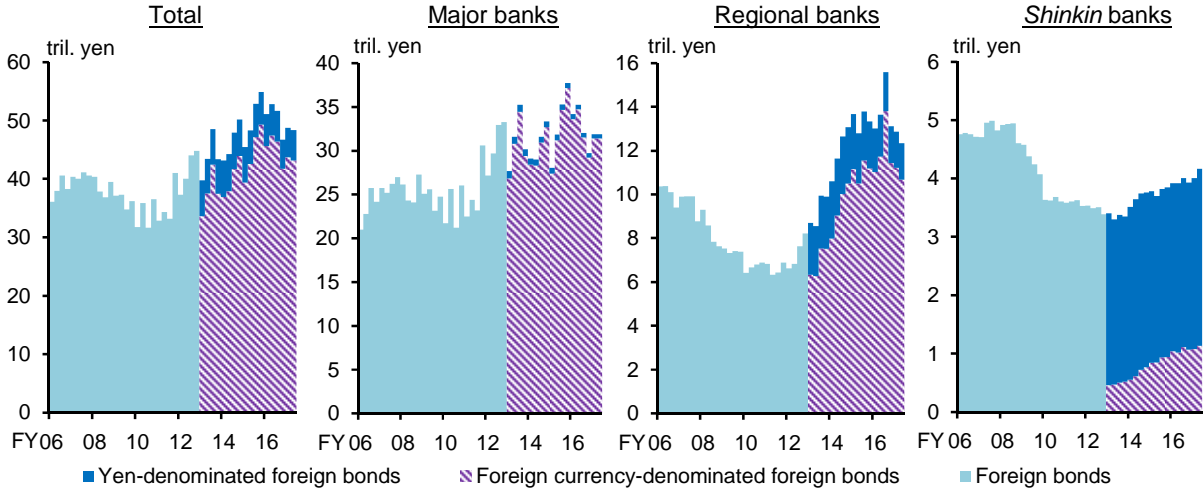
Source: BOJ.

With regard to the outstanding holdings of yen-denominated bonds -- including JGBs, municipal bonds, and corporate bonds -- by type of bank, holdings of regional banks have been decreasing moderately, while major banks, which had been greatly reducing their holdings, have started to purchase yen-denominated bonds again (Chart III-1-25). This reflects the fact that some financial

institutions have refrained from selling JGBs, or have purchased JGBs, in order to secure net interest income, retain unrealized gains, keep their current account deposit balances at the Bank of Japan from increasing, and/or secure collateral for various transactions, in addition to a lull in sales of yen bonds with unrealized gains alongside sales of foreign bonds with unrealized losses.

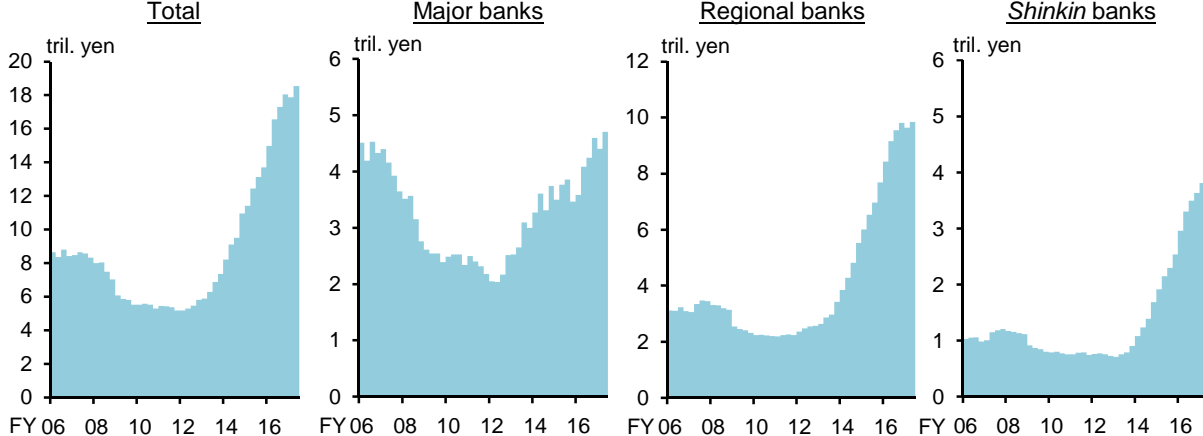
Turning to recent developments in the outstanding holdings of foreign bonds (in yen terms) by type of bank, whereas major banks' holdings have increased, regional banks' holdings are more or less unchanged overall (Chart III-1-26). In response to the return of U.S. interest rates to low levels following their temporary rise after the U.S. presidential election in the fall of 2016, some banks have reduced their target interest rate level for purchases and resumed their purchases with a view to securing net interest income. On the other hand, some other banks have remained cautious of a possible rise in U.S. interest rates and refrained from foreign bond investment.

Chart III-1-26: Outstanding amount of foreign bonds among financial institutions



Note: 1. Latest data as at end-August 2017.
 2. "Foreign bonds" is the sum of figures for foreign currency-denominated and yen-denominated foreign bonds. The data up to March 2010 are figures for foreign securities.
 3. The data are the sum of figures for domestic and overseas branches, based on the outstanding amount at month-end.
 Source: BOJ.

Chart III-1-27: Outstanding amount of investment trusts, etc. among financial institutions



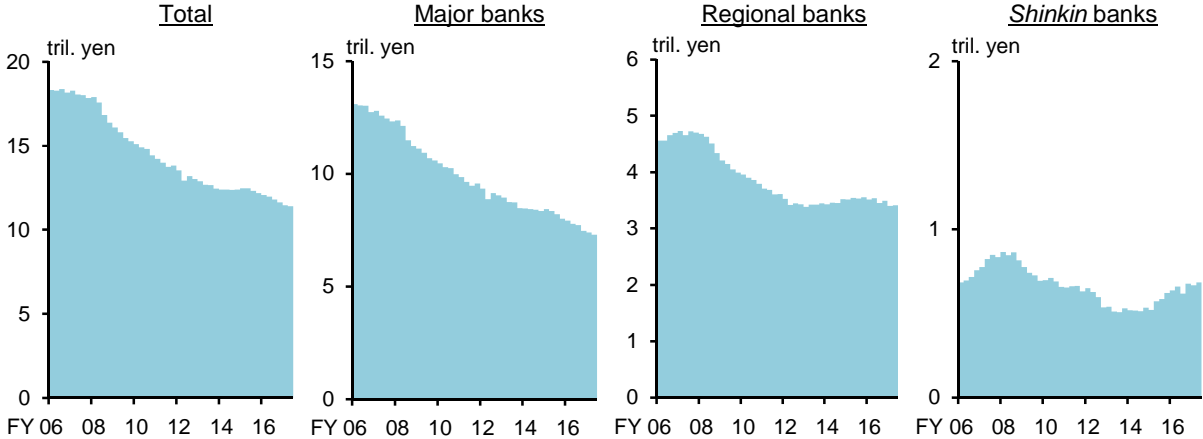
Note: 1. Latest data as at end-August 2017.
 2. The data are the sum of figures for domestic and overseas branches. The data for domestic branches are based on the average amount outstanding. The data for overseas branches are based on the outstanding amount at month-end.
 Source: BOJ.

The outstanding holdings of investment trusts and other assets by financial institutions have continued on an increasing trend (Chart III-1-27). By type, major banks have tended to purchase

stock investment trusts on dips in the stock market, while regional financial institutions have continued to increase their holdings of investment trusts and other assets that carry various risk factors, such as REITs and bond ladder funds both at home and abroad. On the other hand, with stock prices having remained high for the past few years, some banks have sold stock investment trusts with the aim of locking in profits.

Meanwhile, financial institutions' outstanding amount of stockholdings has been on a gradual downtrend, as they continue to reduce their stockholdings aimed at maintaining business ties with firms (i.e., strategic stockholdings) (Chart III-1-28).

Chart III-1-28: Outstanding amount of stockholdings among financial institutions



Note: 1. Latest data as at end-August 2017.
 2. The data for major banks are the figures for domestic branches, and those for the other banks are the sum of figures for domestic and overseas branches. Based on the outstanding amount on a book value basis at month-end.
 3. The data exclude foreign stockholdings.
 Source: BOJ.

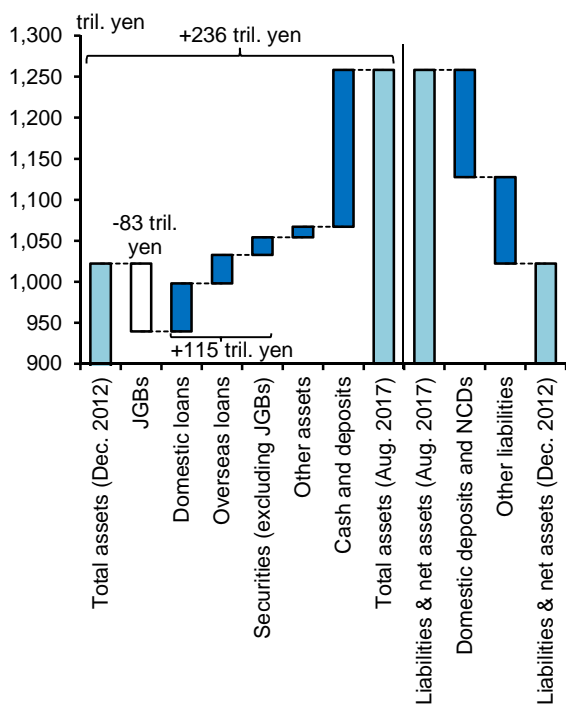
4. Financial institutions' balance sheet changes

Financial institutions have continued to expand the size of their balance sheets reflecting the increase in deposits, and to rebalance their asset portfolios through increasing risky assets.

The total assets and liabilities of financial institutions increased by 236 trillion yen in the period from December 2012, prior to the introduction of QQE, through August 2017 (Chart III-1-29). A breakdown of assets shows that portfolio rebalancing from JGBs (entailing yen interest rate risk) to other risky assets (entailing credit, equity-related, and overseas interest rate risks, etc.) has continued to take place. The total amount of domestic loans, overseas loans, and securities investment excluding JGBs increased by 115 trillion yen, while JGB holdings decreased by 83 trillion yen. Meanwhile, cash and deposits (mainly current account deposits at the Bank of Japan) increased by 191 trillion yen. On the liability side, domestic deposits and NCDs increased by 131 trillion yen, while other liabilities such as corporate bonds increased by 106 trillion yen.

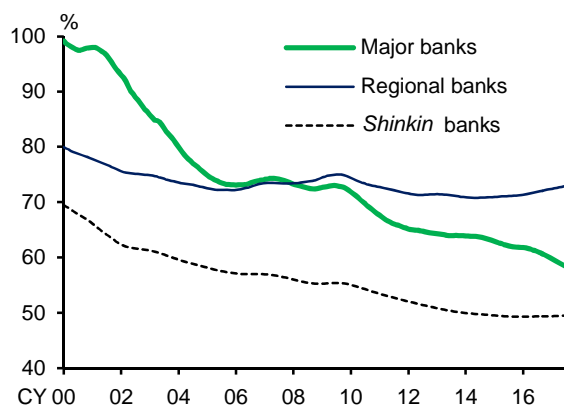
In terms of domestic loan-to-deposit ratios, those of major banks have continued a downward trend, mainly due to an increase in corporate deposits of large firms with strong earnings (Chart III-1-30). On the other hand, the loan-to-deposit ratios among regional financial institutions -- which tend to transact with small firms -- have remained more or less unchanged due to the steady increase in lending, with corporate deposits having grown at a slower rate than those at major banks.

Chart III-1-29: Changes in assets and liabilities among financial institutions



Note: The data are the sum of figures for domestic and overseas branches. The data for domestic branches are based on the average outstanding amount. The data for overseas branches are based on the outstanding amount at month-end.
Source: BOJ.

Chart III-1-30: Domestic loan-to-deposit ratios among financial institutions



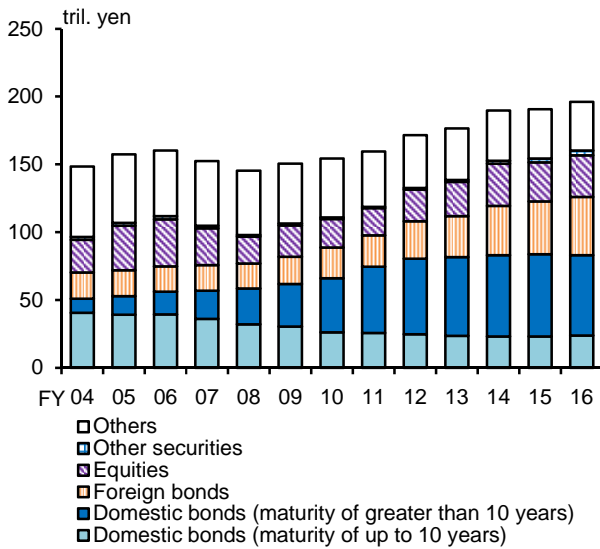
Note: 1. Latest data as at August 2017.
2. Loan-to-deposit ratio = loans / deposits and NCDs.
3. The data are for domestic branches and based on the average outstanding amount.
4. 12-month backward moving averages.
Source: BOJ.

B. Developments in investment by institutional investors

Institutional investors, such as life insurance companies, and depository institutions with a focus on market investment, such as Japan Post Bank and central organizations of financial cooperatives, have continued to accumulate risky assets, particularly foreign bonds.

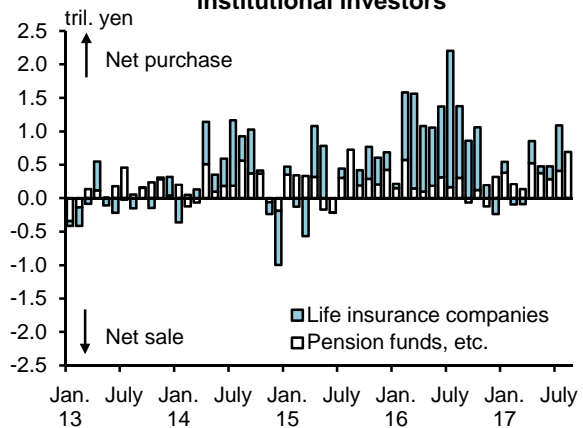
Under the continuing low interest rate environment, life insurance companies have maintained their search for yield and have continued to increase their investment in assets such as foreign bonds and funds (Charts III-2-1 and III-2-2). However, the pace of increase in foreign bond holdings has recently slowed. Reasons include the following: (1) partly reflecting slower growth in sales of level-premium insurance products due to premium hikes since April 2017, premium income -- the source of insurance companies' funds for investment -- has decreased; and (2) U.S. dollar hedging costs have been comparatively high (Chart II-2-2). While the currency hedge ratio for foreign bond portfolios overall is about 70 percent, the number of life insurance companies focusing on selling foreign currency-denominated insurance products has recently been increasing, and these companies have been increasing their unhedged foreign bond investment (Chart III-2-3). Meanwhile, insurance companies have been restraining new purchases of super-long-term JGBs, as the low interest rate environment has continued to make it difficult to extend the asset duration and improve profits at the same time. Moreover, selling stocks to rebalance their portfolios has become somewhat more pronounced with stock prices continuing to rise moderately (Chart III-2-4).

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



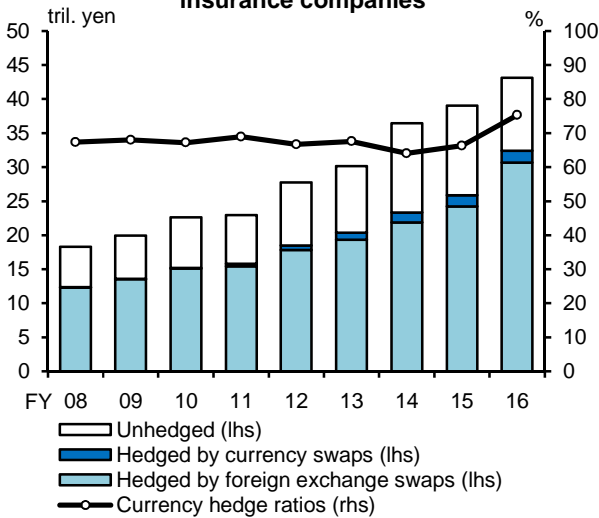
Note: 1. Covers nine major life insurance companies. Latest data as at end-March 2017. Based on general account.
 2. "Other securities" includes investment trusts. "Others" includes cash and deposits, loans, and real estate.
 Source: Published accounts of each company.

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



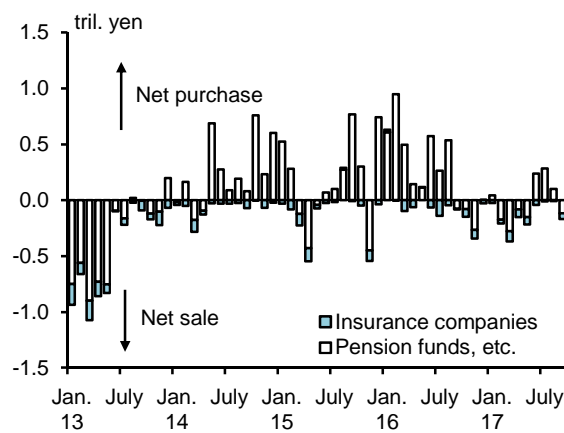
Note: 1. "Pension funds, etc." indicates trust accounts of banks and trust banks.
 2. Latest data as at August 2017.
 Source: Ministry of Finance.

Chart III-2-3: Currency hedge ratios for foreign bond investments among life insurance companies



Note: Covers nine major life insurance companies. The latest data are estimated based on general account as at end-March 2017.
 Source: Published accounts of each company.

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

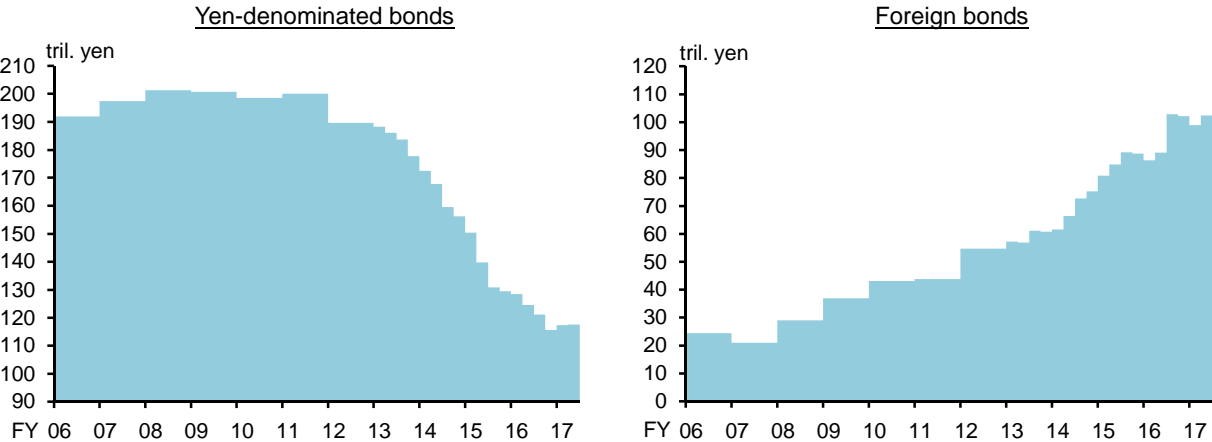


Note: 1. "Pension funds, etc." indicates banking and trust accounts of trust banks.
 2. Latest data as at September 2017.
 Source: Tokyo Stock Exchange.

Depository institutions investing a large proportion of their funds in market investments, such as Japan Post Bank and the central organizations of financial cooperatives, on the whole have also continued to reallocate investments away from yen-denominated bonds toward risky assets such as foreign bonds (Chart III-2-5). As for yen-denominated bonds, although some depository institutions have purchased JGBs with long and super-long maturities as domestic interest rates have risen, such purchases have not been sufficient to offset the decrease in outstanding balances through redemptions. On the other hand, as for foreign bonds, with the aim of securing

net interest income, depository institutions on the whole have increased these bondholdings as a trend, albeit with some fluctuations due to, for example, redemptions.

Chart III-2-5: Outstanding amount of yen-denominated bonds and foreign bonds of Japan Post Bank and central organizations of financial cooperatives



Note: 1. The data are based on the outstanding amount at month-end. Latest data as at end-August 2017. The data for fiscal 2012 and before are as at the end of each fiscal year.
 2. The data are the sum of figures for Japan Post Bank, Shinkin Central Bank, the Shinkumi Federation Bank, the Rokinren Bank, and the Norinchukin Bank.
 Source: BOJ.

In terms of developments in pension funds, the Government Pension Investment Fund (GPIF) has continued to manage its assets in line with the basic portfolio allocation. GPIF has been making arrangements for expanding alternative investments; for example, in April 2017, it launched a call for applications from asset managers for investment in private equities, infrastructure, and real estate. Other public pension funds have also continued to reduce their share of domestic bonds and gradually increase their share of stocks at home and abroad to achieve the basic portfolio allocation. Corporate pension funds have thus far maintained their established cautious investment stance.

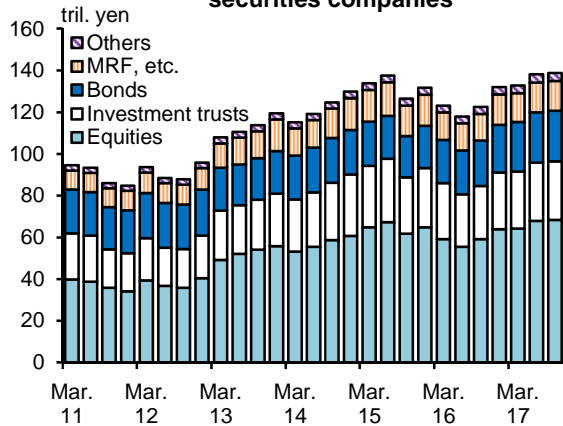
Meanwhile, institutional investors' attention to investments based on environmental, social, and governance (ESG) criteria is growing due to the introduction of the Japanese version of the Stewardship Code, "Principles for Responsible Institutional Investors." There are signs that institutional investors have regarded investment based on ESG criteria as part of alternative investments and have been expanding investment in this area.

C. Developments in households' investment activities

Households have remained cautious in increasing their holdings of risky assets. Although outstanding client assets held at securities companies have continued to increase in fiscal 2017, this is mainly due to the rise in market values reflecting the rise in stock prices (Chart III-3-1). In fact, excluding the effects of changes in stock prices and foreign exchange rate movements on the market values of financial assets, household funds for equity investments outflowed from securities companies on a net basis as profit-taking by "contrarian" retail investors increased (Chart III-3-2). Turning to stock investment trusts, although wrap products have continued to register net inflows, inflows and outflows overall have been roughly on par, reflecting the sale of Japanese stock investment trusts for profit-taking. Meanwhile, monthly dividend funds, which had continued to register net inflows, saw net outflows as a result of a decline in dividends and a reduction in sales companies' product lineups (Chart III-3-3). On the other hand, bonds have

continued to register net inflows, especially bonds such as JGBs for retail investors, which offer relatively high yields compared to bank deposit rates.

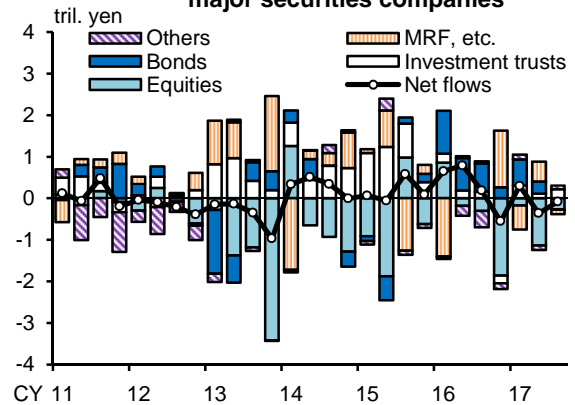
Chart III-3-1: Client assets held by major securities companies



Note: 1. Latest data as at end-August 2017.
 2. Covers retail customers' assets held at 18 major securities companies that hold current accounts at the BOJ.
 3. "Investment trusts" indicates the sum of stock trusts and wrap products. "MRF, etc." includes public and corporate bond trusts.

Source: BOJ.

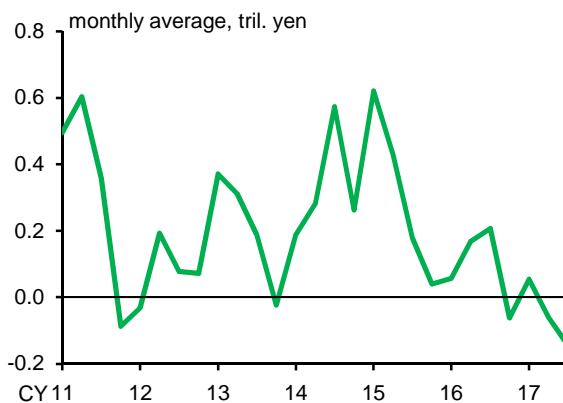
Chart III-3-2: Capital flows by product among major securities companies



Note: 1. Latest data as at July-August 2017.
 2. Covers retail customers' assets held at 18 major securities companies that hold current accounts at the BOJ.
 3. "Investment trusts" indicates the sum of stock trusts and wrap products. "MRF, etc." includes public and corporate bond trusts.

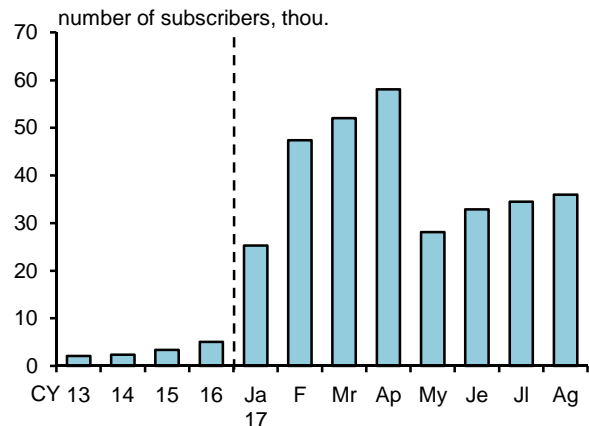
Source: BOJ.

Chart III-3-3: Capital flows of monthly dividend investment trusts



Note: Latest data as at July-August 2017.
 Source: The Investment Trusts Association, Japan.

Chart III-3-4: Number of new subscribers of iDeCo

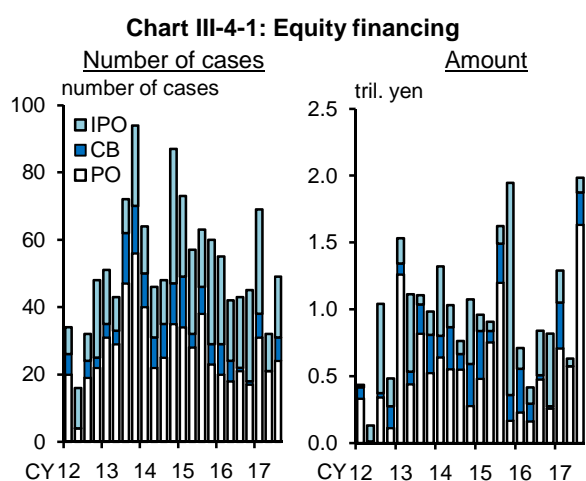


Note: The data up to 2016 are the 12 month-averages from January to December.
 Source: National Pension Fund Association.

Meanwhile, financial institutions have continued to make efforts to increase their client assets through expanding their lineup of products, such as investment trusts suitable for medium- to long-term asset formation for households, and through expanding their services such as wrap accounts. The individual-type Defined Contribution pension plan (iDeCo), the membership criteria of which were relaxed in January 2017, has seen a large increase in new members (Chart III-3-4). In addition, the number of Nippon Individual Savings Accounts (NISAs) and Junior NISAs is steadily increasing, and the introduction of a monthly investment-type NISA is planned for January 2018. These wide-ranging initiatives are expected to help households form assets in a variety of ways.

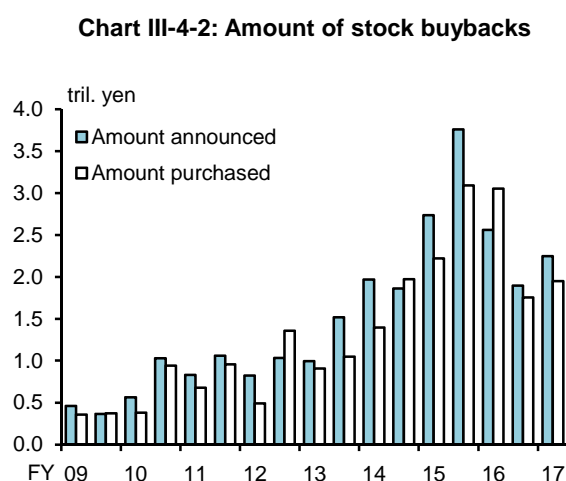
D. Financial intermediation through financial capital markets

In terms of equity financing through the stock market, transactions have remained lackluster amid a growing awareness among firms with regard to capital efficiency. While firms' funding needs related to M&A and other activities have remained strong given the increased momentum toward overseas expansion and industry reorganization, public offering (PO) activity has been sluggish even during the period of a rise in stock prices after the start of fiscal 2017 (Chart III-4-1).⁹ Reasons for the sluggishness of equity financing include an increase in low-interest debt financing (bank loans, CP, and corporate bonds) as well as the impact of the corporate governance code that took effect in June 2015. Amid a growing consciousness among firms with regard to capital efficiency and shareholder returns, firms have maintained a more cautious stance with respect to raising capital through POs. Meanwhile, reflecting a strong awareness regarding shareholder returns, announced and executed stock buybacks by firms had been increasing; however, most recently, they have declined partly due to the increasing cost of stock purchases as a result of the rise in stock prices (Chart III-4-2). Linked to this, the issuance of convertible bonds (CBs) for the purpose of stock buybacks has been decreasing, and the issuance of CBs overall has also been sluggish.



Note: Latest data as at the July-September quarter of 2017.

Source: I-N Information Systems.



Note: 1. Latest data as at the first half of fiscal 2017.

2. Covers stocks listed on the First Section of the Tokyo Stock Exchange. Based on the announcement date.

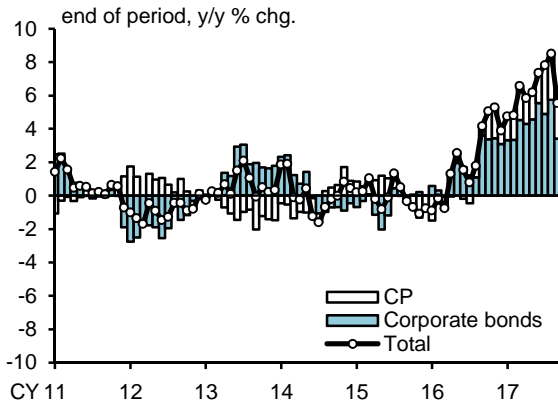
Source: I-N Information Systems.

On the other hand, firms' funding has been growing at a faster pace as issuance rates have hovered at extremely low levels in the CP and corporate bond market (Chart III-4-3). The year-on-year rate of change in the outstanding amount of CP has remained in positive territory. The issuance of ordinary corporate bonds has also been increasing with issuers expecting higher interest rates in the future, and in terms of the use of funds, issuance for the purpose of raising funds for M&As and business fixed investment has been increasing.

Meanwhile, the inflow of funds through public and corporate bond investment trusts has remained slow (Chart III-4-4). With regard to money reserve funds (MRFs), which invest primarily in short-term money markets, a large proportion of their assets under management has now been transferred to trust banks in the form of money trusts, as it has become impossible to earn positive yields through market investment in anything other than CP.

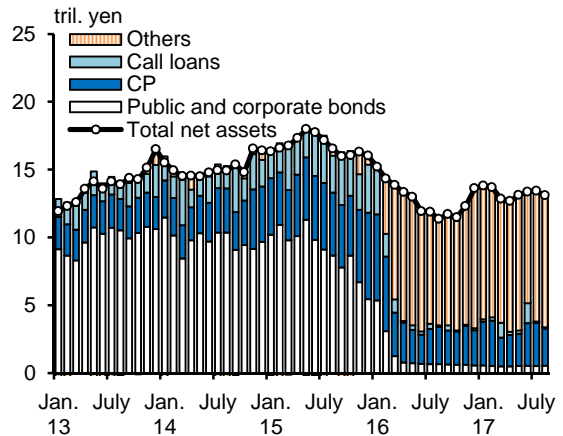
⁹ The offering of shares of Japan Post Holdings (about 1.3 trillion yen) has contributed to the increase in the amount of equity financing at the July-September quarter of 2017, but the number of cases has remained low.

Chart III-4-3: Outstanding amount of CP and corporate bonds



Note: 1. Covers issues of ordinary industrial corporates.
 2. Latest data as at end-September 2017.
 Source: I-N Information Systems; JASDEC.

Chart III-4-4: Investment portfolio of public and corporate bond investment trusts



Note: Latest data as at August 2017.
 Source: The Investment Trusts Association, Japan.

E. Financial Activity Indexes

Given the assessment of financial intermediation in the above four sections, this section examines whether any major imbalances in the financial cycle can be observed using a heat map. The heat map shows, using colors, the deviation of 14 Financial Activity Indexes (FAIXs) from their trends in order to assess whether there are any signs of overheating or excessive contraction in various financial and economic activities (Chart III-5-1).¹⁰

Chart III-5-1: Financial Activity Indexes

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

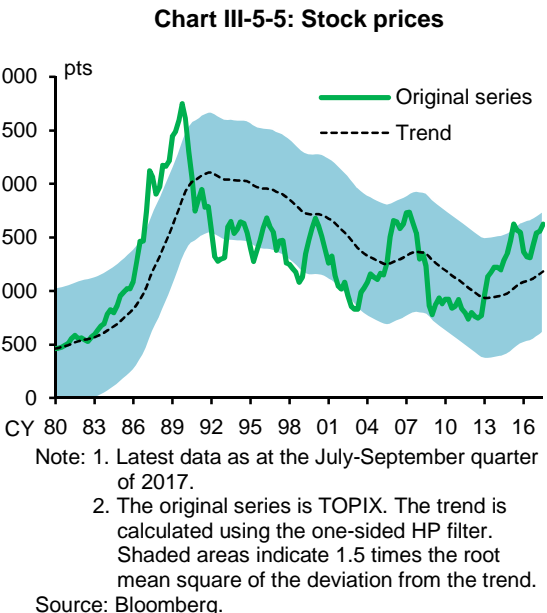
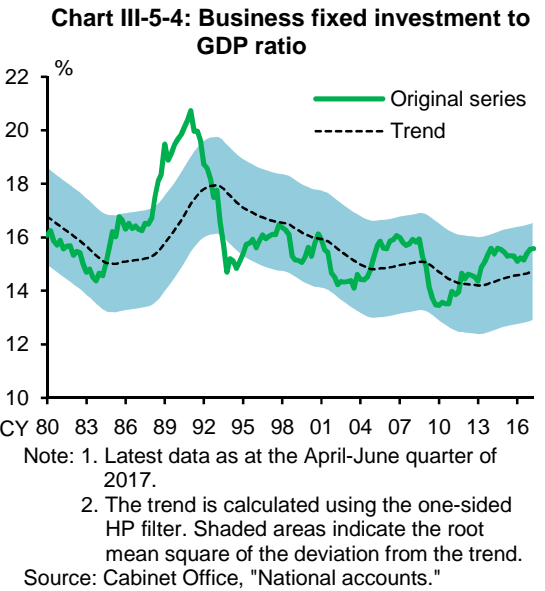
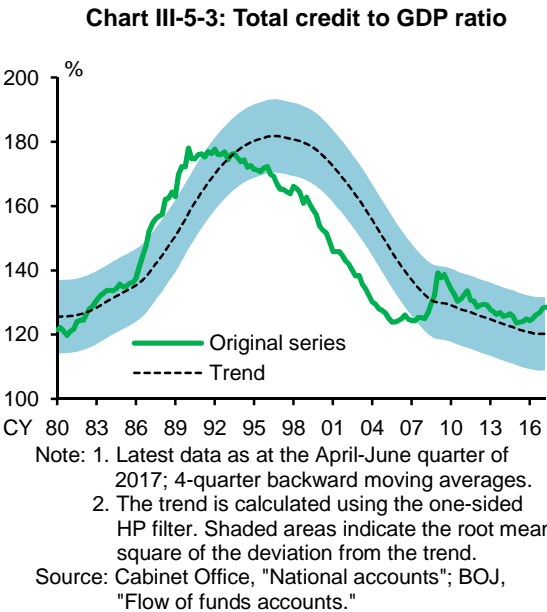
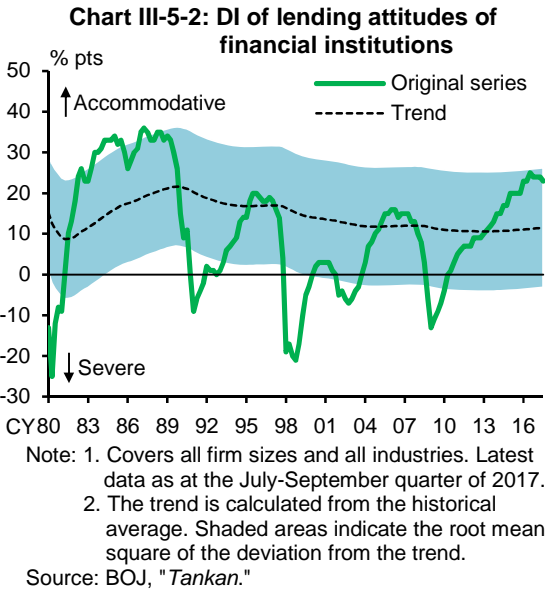
Note: The latest data for the DI of lending attitudes of financial institutions and stock prices as at the July-September quarter of 2017. The latest data for the land prices to GDP ratio as at the January-March quarter of 2017. The latest data for the other indicators as at the April-June quarter of 2017.

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

While the funding conditions among firms and households have been highly

¹⁰ The shaded areas in Chart III-5-1 represent the following: (1) the areas shaded in red (the darkest shaded areas) show that an indicator has risen above the upper threshold, that is, it is overheating; (2) the areas shaded in blue (the second darkest shaded areas) show that an indicator has declined below the lower threshold, that is, it is contracting excessively; (3) the areas shaded in green (the most lightly shaded areas) show a limited tendency toward either extreme; and (4) the areas shaded in white show the periods without data. For details on the FAIXs, see Yuichiro Ito, Tomiyuki Kitamura, Koji Nakamura, and Takashi Nakazawa, "New Financial Activity Indexes: Early Warning System for Financial Imbalances in Japan," Bank of Japan Working Paper, No. 14-E-7, April 2014.

accommodative, none of the indicators are "red," which would signal overheating, or "blue," which would signal excessive contraction, and **on the whole no imbalances in financial and economic activities can be observed**. Specifically, against the background of financial institutions' active lending attitude and favorable issuing conditions for corporate bonds, the "total credit to GDP ratio" has been increasing (Charts III-5-2 and III-5-3).¹¹ In this environment, the corporate sector has been maintaining an active business fixed investment stance. The "business fixed investment to GDP ratio" and "stock prices" have recently risen in tandem, suggesting that an expectation of improved corporate profits is driving the expansion of corporate investment (Charts III-5-4 and III-5-5). Meanwhile, the "DI of lending attitudes of financial institutions" remains

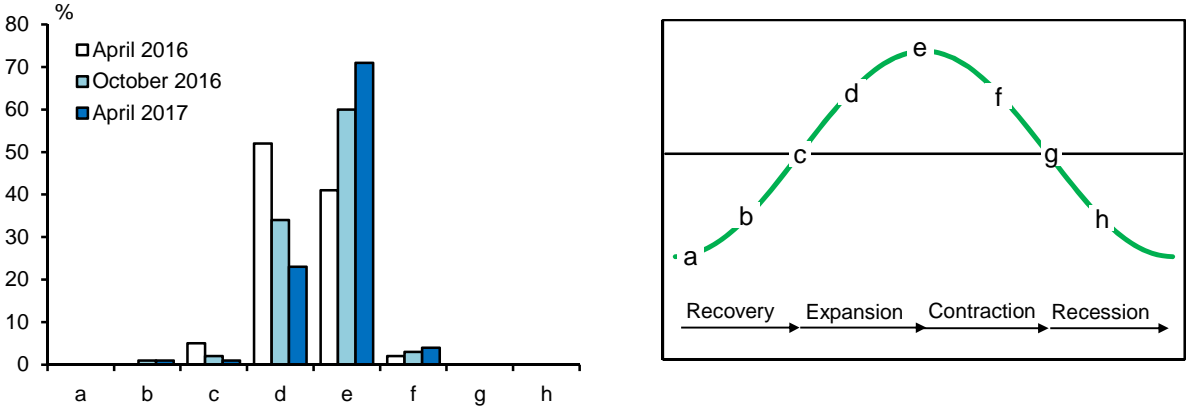


¹¹ Regarding the coverage of "total credit," in the previous issues of the *Report*, the means of credit provision included only lending by private financial institutions and debt securities (corporate bonds and CP); however, from this *Report* onward, lending by the private non-financial sector (loans from business partners and parent firms as well as loans from overseas) is added. Moreover, debtors apart from private firms and households used to also include public corporations, but from this *Report* onward the latter is excluded. These revisions are in line with the "Guidance for National Authorities Operating the Countercyclical Capital Buffer" released by the Basel Committee on Banking Supervision in December 2010.

at the highest level since the bubble period, and although it is still "green," it is in a zone close to "red" (Chart III-5-2). The active lending stance of banks serves as an important transmission channel of monetary easing and helps to improve business sentiment, especially among small firms.¹² However, the more active lending stance of banks in recent years seems to reflect not only the effect of monetary easing but also intensified competition among banks amid the persistent decline in the population and number of firms. Attention should be paid to banks' active lending arising from excessive competition, since this can potentially undermine the stability of the financial system through the easing of loan standards and deterioration in the profitability of loans (see Chapter VI).

Next, **the real estate market does not seem overheated on the whole, although transaction prices remain high in some places such as the Tokyo metropolitan area.** In the commercial real estate market, REITs continue to be major buyers, and supply-demand conditions remain tight. However, the prospect of a large supply of available offices from 2018 onward is weighing on prices, such that it seems that the increase in real estate prices has been leveling off (Charts III-5-6 and III-5-7).¹³ Against this background, the increase in investment by real estate developers has also come to a pause, and the ratio of real estate firms' investment to GDP has recently declined (Chart III-5-8). Moreover, there is also no sign of further bullish expectations among investors in the REIT market. Despite the declining trend of long-term interest rates, the J-REIT capitalization rate, an indicator of investors' expected return, has recently been rising somewhat (Chart III-5-9). Meanwhile, looking at the prices of apartments, while those of second-hand apartments -- especially reasonably priced ones -- have continued to rise, the upward trend in the sales prices of new apartments in the Tokyo metropolitan area has stalled.

Chart III-5-6: Real estate investors' assessment of the market cycle



Note: 1. The proportion of real estate investors (including asset managers, banks, and developers) selecting each given choice as the current conditions (a-h in the right-hand chart) in the Tokyo (Marunouchi and Otemachi) office market.
 2. The April 2017 survey covers 117 respondents.
 Source: Japan Real Estate Institute, "The Japanese real estate investor survey."

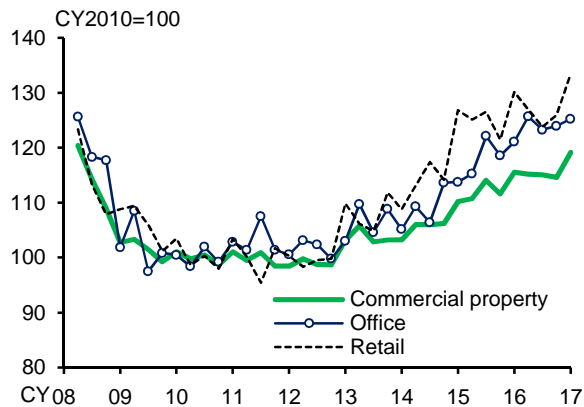
In terms of the future demand for real estate, given the continuing low interest rate environment and strong potential demand for alternative investments from foreign-affiliated funds and institutional investors, there are few indications that real estate demand will eventually start to enter a contraction phase (Chart III-5-6). Moreover, regional financial institutions are planning to further increase investment in real estate funds such as J-REITs and private REITs in fiscal 2017 (Chart III-5-10). However, if stress arises in the global financial markets and a risk-off attitude

¹² For details, see Box 2 in the April 2017 issue of the *Report*.

¹³ The year-on-year rate of increase in commercial real estate prices (for all property types, office, and retail) has been decelerating since around 2015 (Chart III-5-7).

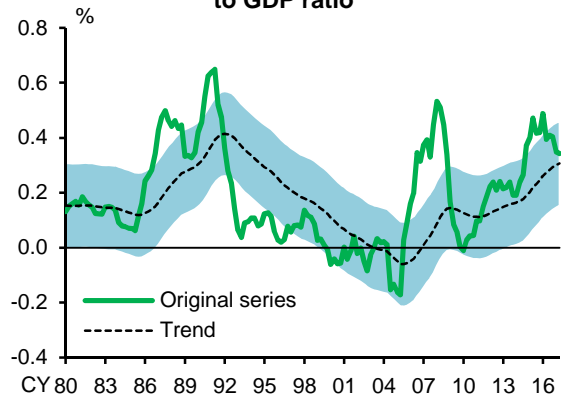
spreads, this may possibly affect the domestic real estate market. Therefore, developments in the real estate market continue to warrant vigilance.

Chart III-5-7: Commercial property prices



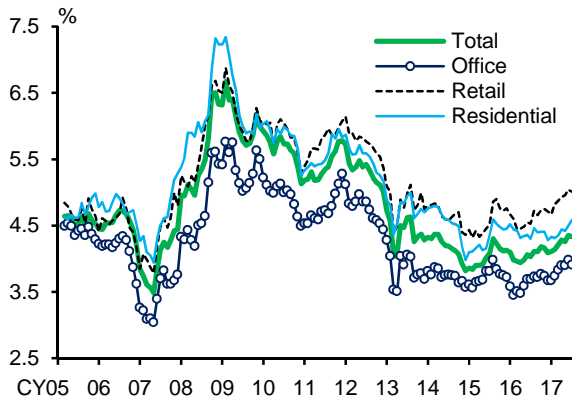
Note: Latest data as at the January-March quarter of 2017.
Source: Ministry of Land, Infrastructure, Transport and Tourism, "Japan property price index."

Chart III-5-8: Real estate firms' investment to GDP ratio



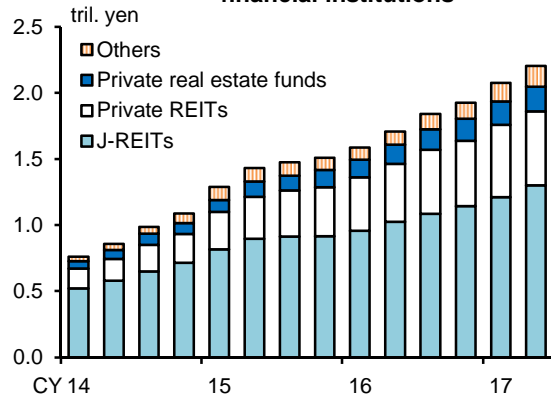
Note: 1. Covers large firms in the real estate industry. Latest data as at the April-June quarter of 2017; 4-quarter backward moving averages.
2. Original series = (business fixed investment [including land investment] + inventory investment) / nominal GDP.
3. The trend is calculated using the one-sided HP filter. Shaded areas indicate the root mean square of the deviation from the trend.
Source: Cabinet Office, "National accounts"; Ministry of Finance, "Financial statements statistics of corporations by industry."

Chart III-5-9: Capitalization rates of J-REITs



Note: 1. Latest data as at end-July 2017.
2. Capitalization rate = leasing business profits before depreciation / acquisition value of J-REITs.
Source: Sumitomo Mitsui Trust Research Institute.

Chart III-5-10: Equity investments in real estate funds by regional financial institutions



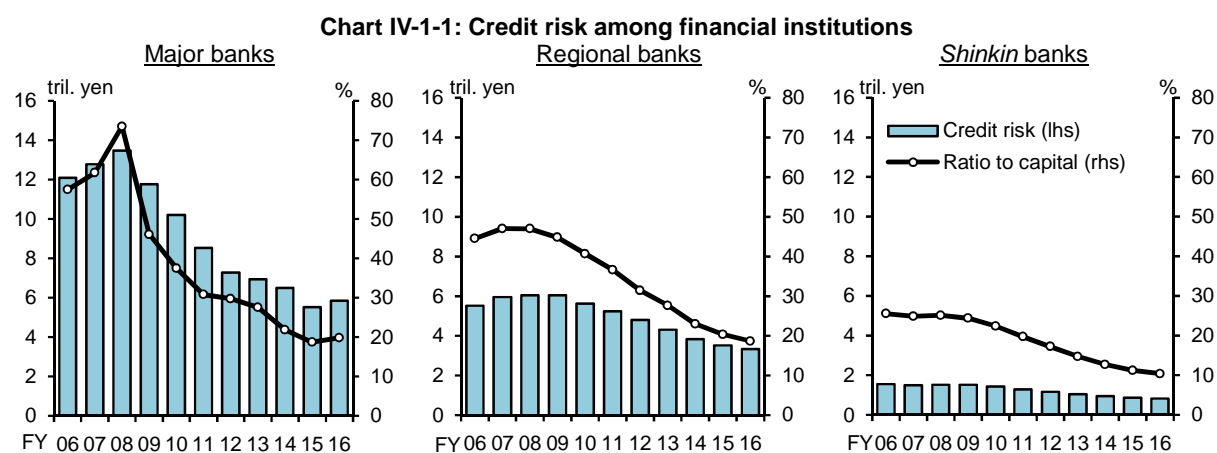
Note: Latest data as at end-June 2017.
Source: BOJ.

IV. Financial institutions' risk profile and financial bases

In this chapter, we examine the entire financial system's risk profile (comprising the size of risks accumulated, the speed of accumulation, and the distribution of risks as well as its skewness within the system) by mainly analyzing financial institutions' financial data at an aggregate level, and then assess the adequacy of their financial bases (financial institutions' capital and funding liquidity) relative to risks at the current juncture.¹⁴

A. Credit risk

The amount of financial institutions' credit risk has remained at a low level (Chart IV-1-1).¹⁵ By type of bank, the ratio of the amount of credit risk to that of capital has remained at around 20 percent at major banks and regional banks and at around 10 percent at *shinkin* banks.



Note: 1. Credit risk is unexpected losses with a 99 percent confidence level.

2. Covers credit that is subject to self-assessment.

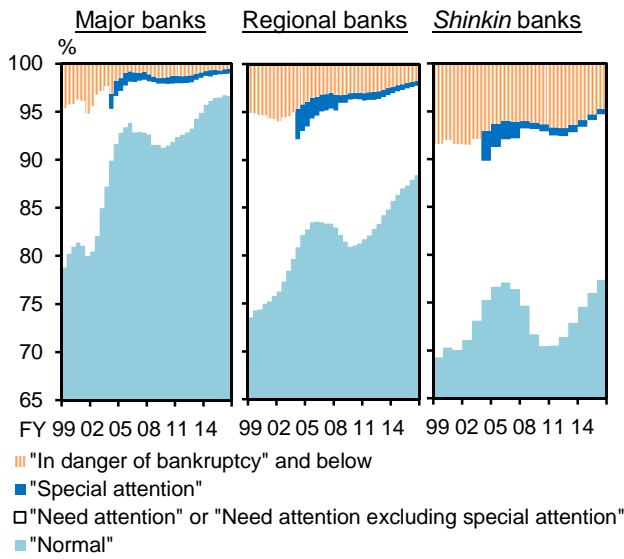
Source: BOJ.

The reason that the credit risk amount has remained at a low level despite the increase in financial institutions' domestic and overseas loans outstanding is **the continuing improvement in the quality of their loans** reflecting improved financial conditions among firms amid the moderate growth of the domestic and overseas economies. The amount of loans outstanding by borrower classification shows that the ratio of normal loans to total loans has already reached extremely high levels at major banks and has continued to rise at regional financial institutions (Chart IV-1-2). Against this background, **credit cost ratios have remained at extremely low levels for every type of bank** (Chart IV-1-3). At major banks, the ratio of "need attention" and below loans to total overseas loans had increased somewhat due to the impact of the past decline in commodity prices but shows little change at the moment (Chart IV-1-4).

¹⁴ Most of the data used in the analysis in this chapter, particularly in the sections on credit risk and bank capital, were current as at the end of March 2017. In the sections on market risk and liquidity risk, the latest available data are used. Moreover, unless otherwise noted, the figures for financial institutions' capital in the charts show common equity Tier 1 (CET1) capital for internationally active banks from fiscal 2012 onward, core capital for domestic banks from fiscal 2013 onward, and Tier 1 capital for both before that (excluding the phase-in arrangements).

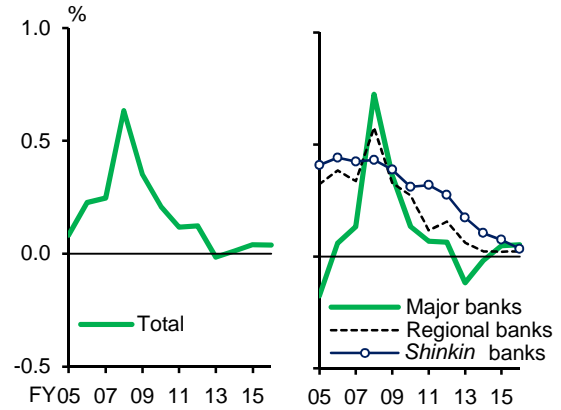
¹⁵ Credit risk as defined here refers to unexpected losses. Unexpected losses are estimated by deducting the average amount of losses arising in 1 year (expected losses) from the maximum amount of losses envisaged within 99 percent of the possible outcomes in 1 year. Further, the method of measuring the amount of risk was revised for this *Report*. In addition to setting more conservative values for the correlation coefficients among asset classes, borrowers were divided into more detailed classifications for the aggregation.

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



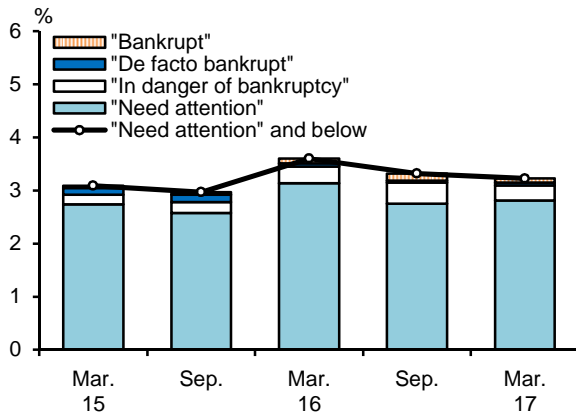
Note: 1. Latest data as at end-March 2017.
 2. "Need attention" or "Need attention excluding special attention" indicates "Need attention" through fiscal 2003 and "Need attention excluding special attention" from fiscal 2004.
 Source: BOJ.

Chart IV-1-3: Credit cost ratios among financial institutions



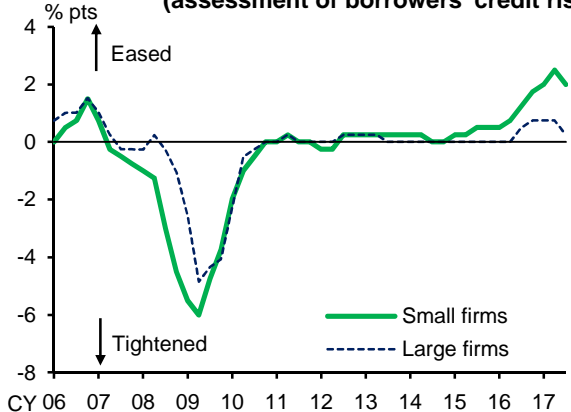
Note: Latest data as at fiscal 2016.
 Source: BOJ.

Chart IV-1-4: Ratios of "need attention" and below loans to overseas loans



Note: The ratio of the outstanding amount of each loan to overseas loans. Covers the three major banks.
 Source: BOJ.

Chart IV-1-5: DI for terms and conditions of loans (assessment of borrowers' credit risk)



Note: 1. Latest data as at July 2017; 4-quarter backward moving averages.
 2. Based on the proportion of financial institutions selecting each given choice as a response to "how have the terms and conditions of loans to firms changed?" the DI is calculated as follows:
 $DI = \text{"eased considerably"} + 0.5 * \text{"eased somewhat"} - 0.5 * \text{"tightened somewhat"} - \text{"tightened considerably"}.$

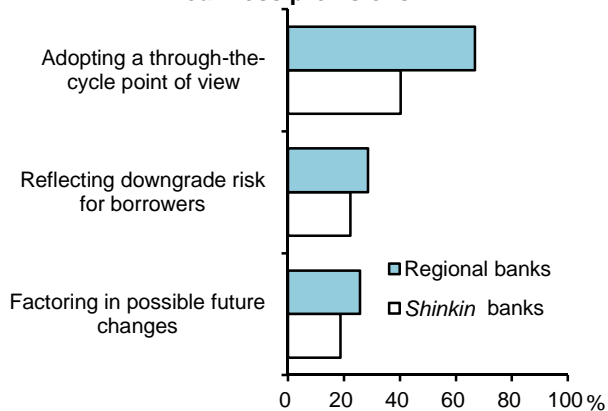
Source: BOJ, "Senior loan officer opinion survey on bank lending practices at large Japanese banks."

As credit costs are at historically low levels, some financial institutions have eased their assessment of borrowers' credit risk, particularly with regard to small firms (Chart IV-1-5). It is, however, more desirable for financial institutions to adopt a through-the-cycle point of view in calculating loan-loss provisions (Chart IV-1-6).¹⁶ With regard to credit risk management, financial institutions need to measure credit risk through stress testing that assumes future environmental

¹⁶ For details, see "Revisions to Loan-Loss Provision Calculation Methods by Regional Financial Institutions," *Financial System Report Annex Series*, April 2017 (available in Japanese only).

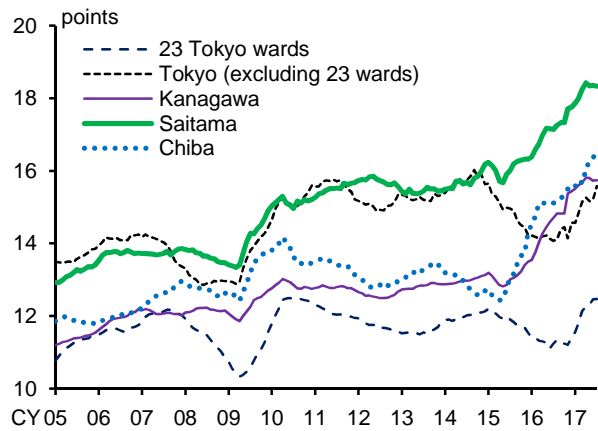
changes, taking changes in the characteristics of credit portfolios into account. Furthermore, they need to continue to make efforts to improve the effectiveness of such risk management.

Chart IV-1-6: Reasons for reviewing methodology of loan-loss provisions



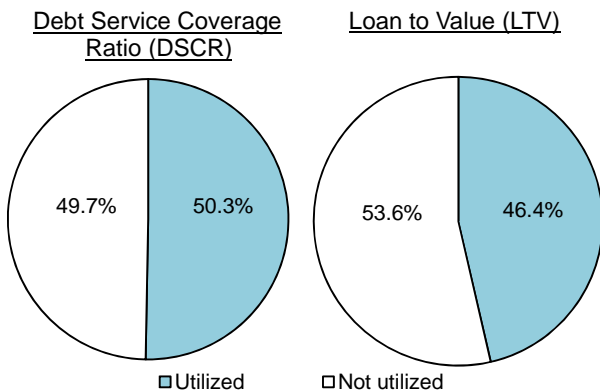
Note: The results of the risk management survey conducted in fiscal 2016. Reasons for the review from fiscal 2010 to fiscal 2015 are counted (multiple choices allowed). Source: BOJ.

Chart IV-1-7: Vacancy indices of rental housing



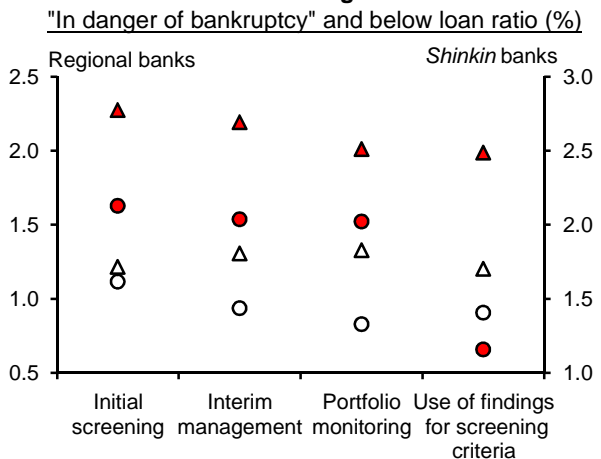
Note: 1. Latest data as at July 2017.
2. Vacancy index is the number of unoccupied rental units divided by the number of all rental units. The denominator is partially estimated by TAS. Source: TAS, "Residential market report."

Chart IV-1-8: Utilization of quantitative criteria at the initial screening of loans for rental housing business



Note: 1. The preliminary results of the survey conducted in fiscal 2017 on the risk management of loans for the rental housing business. Covers regional banks and shinkin banks.
2. "DSCR" is the ratio of net income from real estate business to principal and interest repayments. "LTV" is the ratio of credit amount to the market value of real estate. Source: BOJ.

Chart IV-1-9: Utilization of risk management tools and quality of loans for rental housing business



Note: 1. The results of the survey conducted in fiscal 2016 on the risk management of loans for the rental housing business.
2. Financial institutions whose real estate loan ratio to total loans is above the average for each type of bank are divided into two groups based on the degree of utilization of (1) the quantitative criteria (DSCR and LTV) in the initial screening, interim management, and portfolio monitoring, and (2) monitoring findings for the screening criteria. "In danger of bankruptcy" and below loan ratio for the rental housing business is calculated for each group. Source: BOJ.

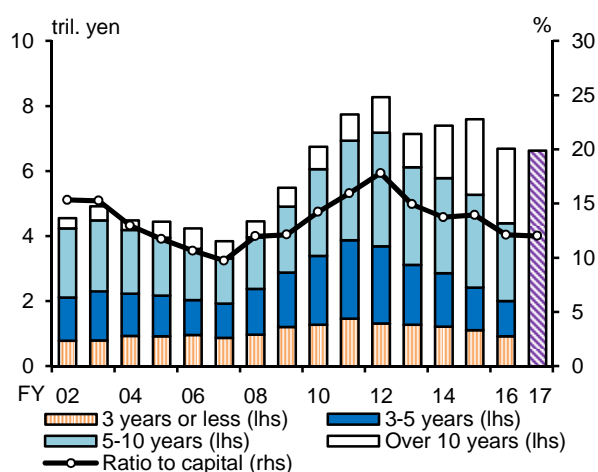
Credit risk related to real estate loans

As pointed out in Chapter III, the outstanding amount of real estate loans has continued to grow at a high rate so far, although some efforts to rein in new lending have been observed. Some sign of changes in the upward trend in the real estate market can be observed and vacancy rates in some regional rental housing markets have continued to rise (Charts III-5-7 and IV-1-7).¹⁷ Against these backgrounds, financial institutions need to further increase the effectiveness of their credit risk management of loans for the rental housing business through the enhancement of initial screening and interim management of such loans (Chart IV-1-8). In fact, those that do not employ quantitative criteria -- such as the debt-service coverage ratio (DSCR) and the loan-to-value (LTV) ratio -- in their initial screening and interim management as well as those that do not reflect the results of portfolio monitoring in their screening criteria tend to have loans of lower quality (Chart IV-1-9).

B. Market risk

The following section assesses three aspects of market risk, namely, yen interest rate risk, foreign currency interest rate risk, and market risk associated with stockholdings.

Chart IV-2-1: Interest rate risk associated with yen-denominated bondholdings among financial institutions

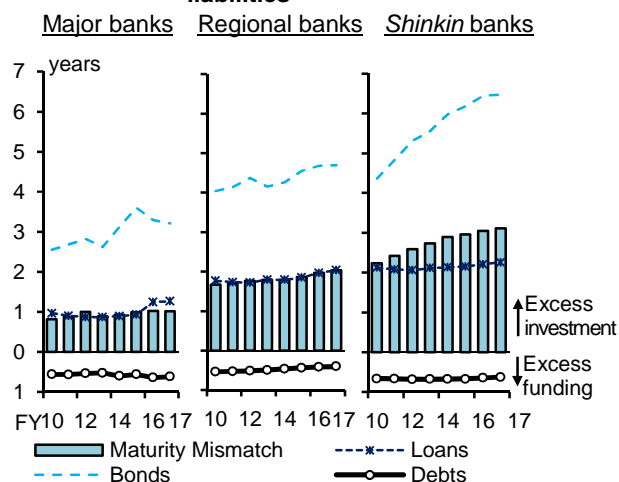


Note: 1. The data for fiscal 2017 are estimated as at end-July 2017.

2. Interest rate risk: 100 basis point value in the banking book. Convexity and higher order terms are taken into account.

Source: BOJ.

Chart IV-2-2: Average remaining maturity of yen-denominated assets and liabilities



Note: 1. The data for fiscal 2017 are as at end-June 2017.

2. The maturity mismatch is the difference between the average remaining maturity of assets and that of liabilities. The average remaining maturity of assets is the weighted average of loans, bonds, and interest rate swaps with interest receipts. The average remaining maturity of liabilities is the weighted average of debts and interest rate swaps with interest payments.

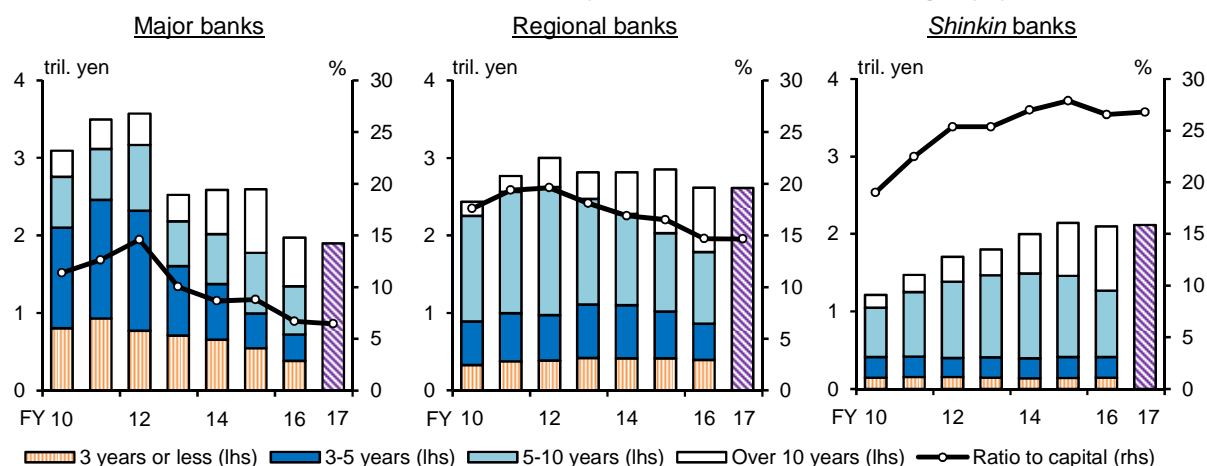
Source: BOJ.

¹⁷ The denominator used to calculate the vacancy indices in Chart IV-1-7 includes only the total number of units seeking tenants and does not include the total number of units in fully occupied buildings. Thus, the occurrence of a small number of vacancies in hitherto fully occupied buildings depresses the index because those buildings are now included in the computation. Likewise, when vacancies are filled and the building becomes fully occupied, the index is pushed up, because the fully occupied buildings are no longer included in the computation. Caution should therefore be taken when interpreting short-term fluctuations in the index.

Yen interest rate risk

The amount of interest rate risk associated with financial institutions' yen-denominated bond investments remains at a high level from a medium- to long-term perspective, even though it has declined from its peak in 2012 (Chart IV-2-1).¹⁸ While a decrease in the outstanding amount of yen-denominated bonds puts downward pressure on the amount of interest rate risk, an extension of the duration of bond portfolios exerts upward pressure thereon (Chart IV-2-2).

Chart IV-2-3: Interest rate risk associated with yen-denominated bondholdings by type of bank

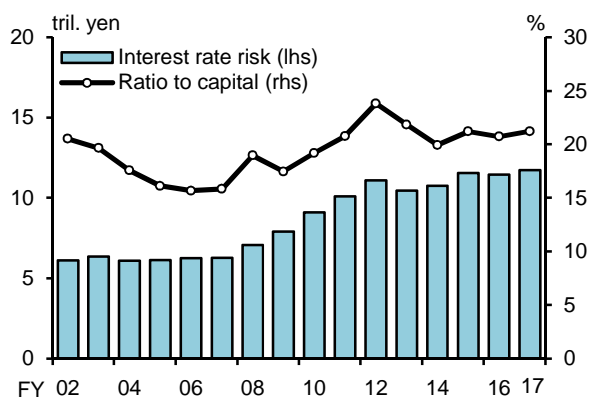


Note: 1. The data for fiscal 2017 are estimated as at end-July 2017.

2. Interest rate risk: 100 basis point value in the banking book. Convexity and higher order terms are taken into account.

Source: BOJ.

Chart IV-2-4: Yen-denominated interest rate risk among financial institutions

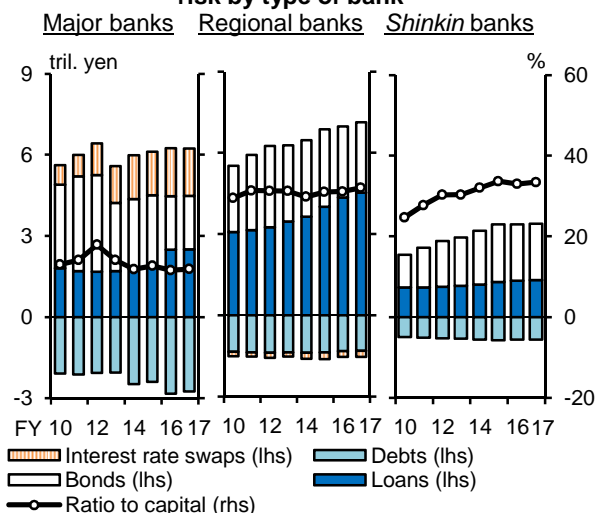


Note: 1. The data for fiscal 2017 are as at end-June 2017.

2. Interest rate risk: 100 basis point value in the banking book. Convexity and higher order terms are taken into account. For major banks and regional banks, off-balance-sheet transactions (interest rate swaps) are included.

Source: BOJ.

Chart IV-2-5: Yen-denominated interest rate risk by type of bank



Note: 1. The data for fiscal 2017 are as at end-June 2017.

2. Interest rate risk: 100 basis point value in the banking book. Convexity and higher order terms are taken into account. For major banks and regional banks, off-balance-sheet transactions (interest rate swaps) are included.

Source: BOJ.

By type of bank, the ratio of the amount of interest rate risk associated with yen-denominated bond

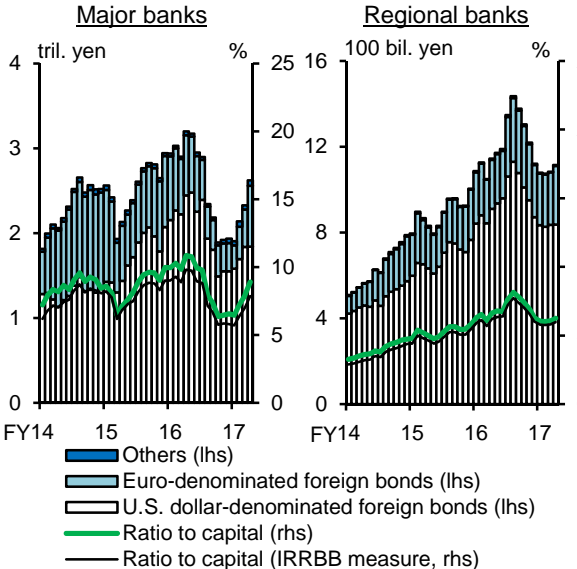
¹⁸ The analysis here estimates changes in the market value of bondholdings in the case of a parallel shift where interest rates for all maturities rise by 1 percentage point.

investments to the amount of capital has been low, below 10 percent at major banks, but relatively high at around 15 percent at regional banks and around 25 percent at *shinkin* banks (Chart IV-2-3). A similar pattern by type of bank is found for the amount of yen interest rate risk overall on financial institutions' balance sheets -- that is, yen interest rate risk including components such as loans and deposits in addition to bond investments (Charts IV-2-4 and IV-2-5).¹⁹

Foreign currency interest rate risk

The amount of interest rate risk associated with foreign currency-denominated bond investments by financial institutions has decreased from the peak in the middle of 2016 (Chart IV-2-6).²⁰ This is a result of the reduction in foreign bondholdings and a shortening of the duration of these bonds in response to the rise in overseas interest rates since the fall of 2016. Since the start of fiscal 2017, some major banks have been extending the duration of foreign bonds somewhat and have been increasing their long positions again, but on the whole, the

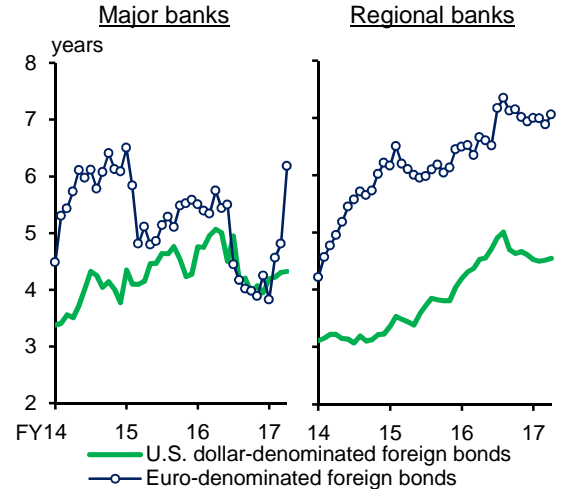
Chart IV-2-6: Interest rate risk of foreign currency-denominated foreign bonds



Note: 1. Latest data as at end-July 2017.
 2. Interest rate risk: 200 basis point value in the banking book. Off-balance-sheet transactions are included at major banks and not at regional banks.
 3. "Ratio to capital (IRRBB measure)" is calculated by using Tier 1 capital for internationally active banks and core capital for domestic banks (including the phase-in arrangements).

Source: BOJ.

Chart IV-2-7: Average remaining maturity of foreign currency-denominated foreign bonds



Note: 1. Latest data as at end-July 2017.
 2. Average remaining maturity is estimated based on the interest rate risk.

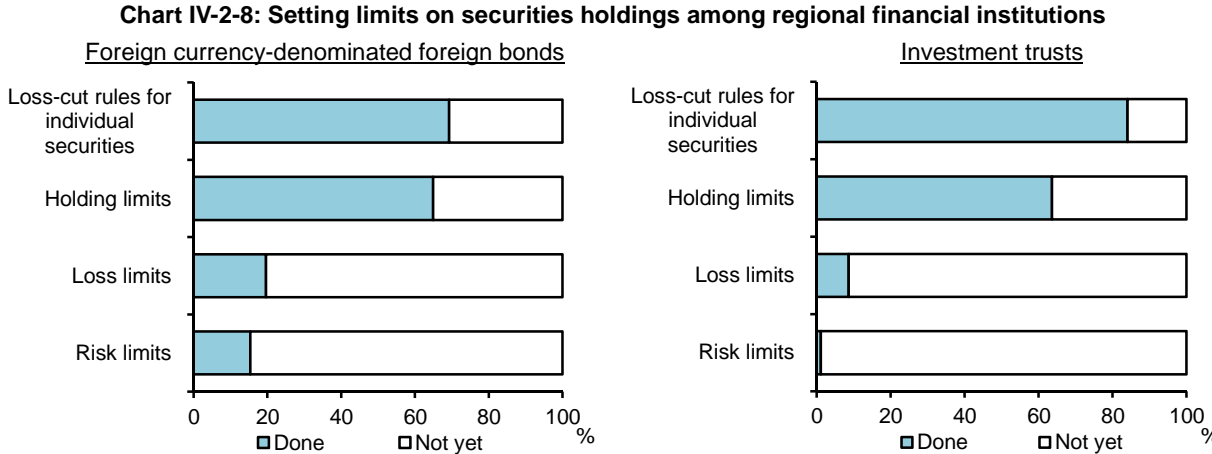
Source: BOJ.

¹⁹ The 100 basis point value (bpv) is used to estimate changes in economic value associated with all assets and liabilities given a parallel shift in the yield curve, in which interest rates for all maturities increase by 1 percentage point. When the average duration of assets is longer than that of liabilities, a widening maturity mismatch (the difference between the duration of assets and liabilities) will amplify interest rate risk. In this estimation of changes in value, the 100 bpv only includes the interest rate risk associated with yen-denominated assets (loans and bonds), yen-denominated liabilities, and yen interest rate swaps (*shinkin* banks are not taken into account). It does not reflect the risk associated with foreign currency-denominated assets and liabilities or off-balance-sheet transactions, other than yen interest rate swaps. We assume that the duration of demand deposits is 3 months or less when the effect of the 100 bpv on liabilities is calculated, meaning that so-called "core deposits" are not taken into account.

²⁰ Based on the proposal for reform of the supervision guidelines with regard to interest rate risk in the banking book (IRRBB), released by the Financial Services Agency in June 2017, the interest rate risk on foreign currency-denominated foreign bonds in Chart IV-2-6 is calculated as a change in the economic value given a parallel shift in the yield curve, in which interest rates for all maturities increase by 2 percentage points.

amount of risk has been restrained (Chart IV-2-7). The ratio of the amount of interest rate risk associated with foreign currency-denominated bonds to capital at both major banks and regional banks has been around 6-9 percent.

As pointed out in Chapter II, interest rate volatility -- especially in U.S. Treasuries -- has been at a historically low level, but such an environment will not necessarily persist in the future. If volatility were to return, as it did during the "taper tantrum" in 2013, there is a risk that fluctuations in interest rates will be amplified through a surge in sales by investors, including financial institutions conducting VaR management. It is important for financial institutions to improve and strengthen their management and operational framework that strikes a correct balance between risks and returns, for example by improving the effectiveness of loss-cut rules and by setting a variety of limits on their securities investments (Chart IV-2-8).



Note: The results of the survey conducted in fiscal 2016 on the risk management of securities. Covers regional banks and *shinkin* banks that hold each type of securities.
 Source: BOJ.

Market risk associated with stockholdings

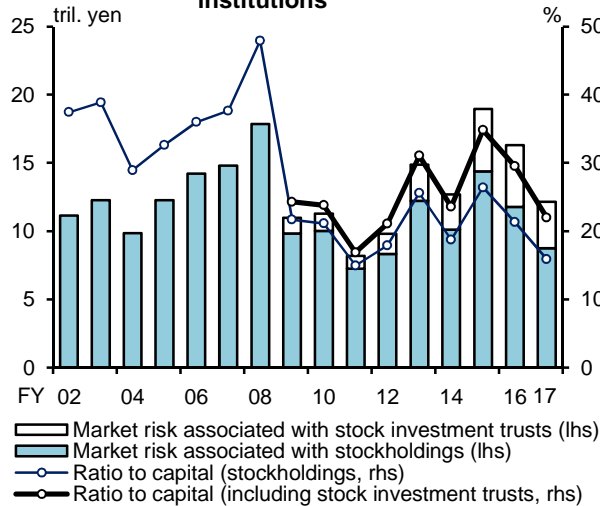
The amount of market risk associated with stockholdings (including stock investment trusts) at financial institutions has recently decreased due mainly to the decline in market volatility (Charts IV-2-9 and IV-2-10).²¹ Stock acquisition by financial institutions overall, an increase in the "factor of amount in face value," is not a main factor that accounts for the change in the amount of market risk associated with stockholdings. By type of bank, while a reduction in strategic stockholdings has reduced the amount of market risk associated with stockholdings at major banks, more active investment in stock investment trusts at regional financial institutions has exerted upward pressure thereon. The ratio of the amount of market risk associated with stockholdings to the amount of capital has been in the range of 20-25 percent at major banks and regional banks, and around 10 percent at *shinkin* banks (Chart IV-2-11).

As a result of an increase in investment trust holdings, financial institutions have taken on not only market risk associated with stockholdings, but also various other market risks related to overseas interest rates, foreign exchange rates, and real estate prices (Charts IV-2-12 and IV-2-13). Thus, financial institutions need to do a cross-sectional check of the impact on their portfolios of fluctuations in risk factors, and to adopt a management and operational framework that takes account of the size of risks and their correlations as well as profitability. For example, financial

²¹ The market risk associated with stockholdings (including stock investment trusts) computed here is estimated on a VaR with a 99 percent confidence level and a 1-year holding period.

institutions should examine from a wide range of perspectives the impact of changes in the market environment -- such as an increase in volatility in the global financial markets or a change in the direction of the domestic real estate market -- on the market value of financial assets and profits. Moreover, based on such examination, it is important for financial institutions to consider possible measures to be taken in response to stress in a systematic manner.

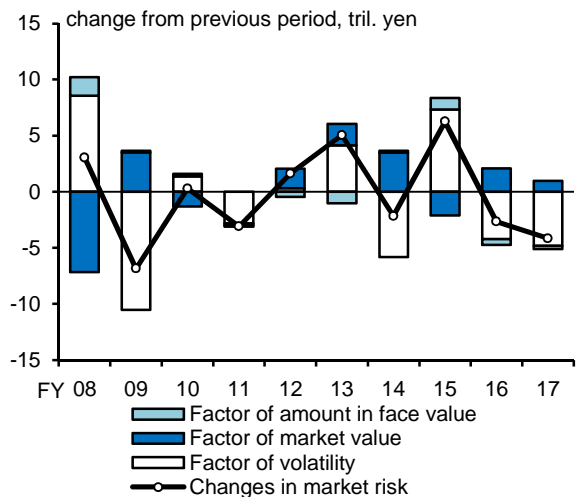
Chart IV-2-9: Market risk associated with stockholdings among financial institutions



Note: 1. The data for fiscal 2017 are estimated using the outstanding amount of stockholdings and stock investment trusts as at end-July 2017 and stock prices up to end-July 2017.
 2. Market risk associated with stockholdings and stock investment trusts: value-at-risk with a 99 percent confidence level and a 1-year holding period, and excludes risk associated with foreign currency-denominated ones. Pre-fiscal 2009 data do not include stock investment trusts.

Source: BOJ.

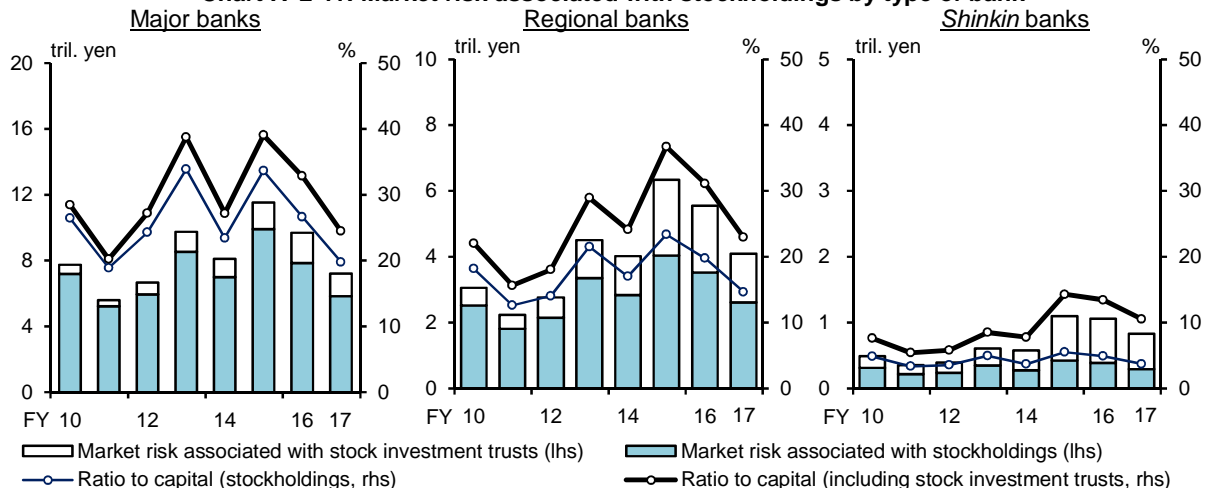
Chart IV-2-10: Factors of changes in market risk associated with stockholdings among financial institutions



Note: 1. The data for fiscal 2017 are estimated.
 2. Market risk associated with stockholdings and stock investment trusts: value-at-risk with a 99 percent confidence level and a 1-year holding period, and excludes risk associated with foreign currency-denominated ones. There is a discontinuity in the underlying data as of fiscal 2009.

Source: BOJ.

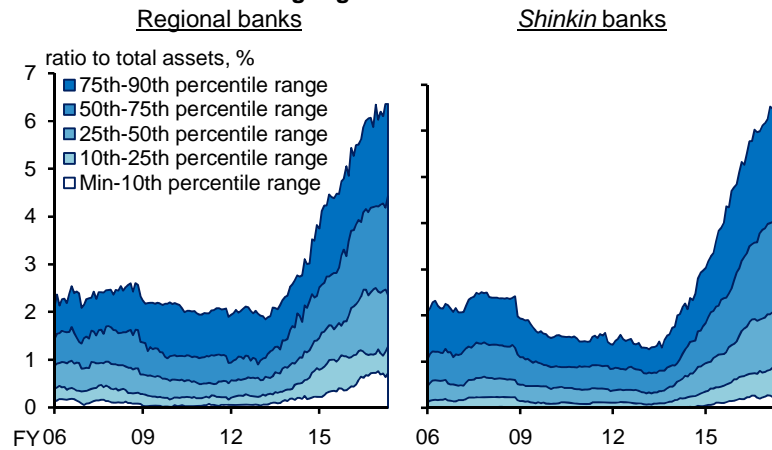
Chart IV-2-11: Market risk associated with stockholdings by type of bank



Note: 1. The data for fiscal 2017 are estimated using the outstanding amount of stockholdings and stock investment trusts as at end-July 2017 and stock prices up to end-July 2017.
 2. Market risk associated with stockholdings and stock investment trusts: value-at-risk with a 99 percent confidence level and a 1-year holding period, and excludes risk associated with foreign currency-denominated ones.

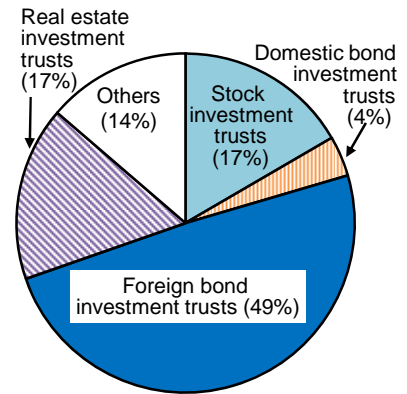
Source: BOJ.

Chart IV-2-12: Distribution of outstanding amount of investment trusts among regional financial institutions



Note: 1. Latest data as at end-August 2017.
 2. The data are each financial institution's ratios of outstanding amounts of investment trusts (based on book values) to total assets.
 Source: BOJ.

Chart IV-2-13: Breakdown of investment trusts among regional financial institutions



Note: 1. Data as at end-June 2017.
 2. Based on book values.
 Source: BOJ.

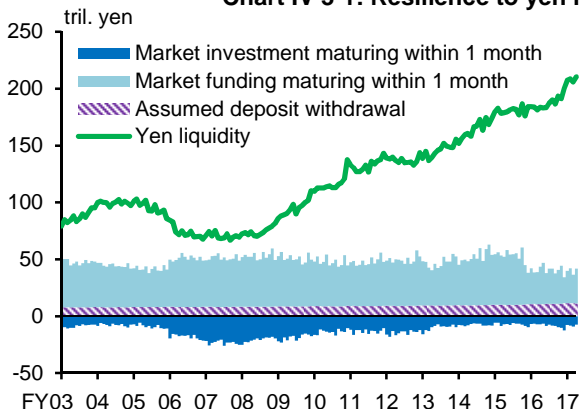
C. Funding liquidity risk

In this section, we assess funding liquidity risk, first in yen and then in foreign currencies.

Yen funding liquidity risk

Financial institutions have sufficient yen funding liquidity. The stability of the investment and funding structure of yen is high, mainly because: (1) the majority of the funding is sourced from stable retail deposits; (2) the outstanding amount of deposits is far larger than total loans outstanding; and (3) a large part of the excess of deposits over loans is invested in highly liquid securities, such as JGBs, or current account deposits at the Bank of Japan. It is assessed that financial institutions have a sufficiently high degree of resilience to short-term stress, as they hold liquid assets worth far more than the expected fund outflows even under stress situations (Chart IV-3-1).²²

Chart IV-3-1: Resilience to yen liquidity stress among major banks



Note: 1. Latest data as at end-July 2017.
 2. It is assumed that 3 percent of deposits are withdrawn.
 3. Yen liquidity = cash + deposits + JGBs.
 Source: BOJ.

²² In accordance with the concept of the Liquidity Coverage Ratio (LCR), here we assume an outflow of market funding with a maturity of 1 month or less and an outflow amounting to 3 percent of total deposits. In the computation of the LCR, more complex stress situations than the one featured here are assumed, such as the withdrawal of committed lines and the downgrading of credit ratings. Thus, it should be noted that the assumption for fund outflows under stress does not fully conform to the definition of the LCR.

Funding liquidity risk for foreign currencies

Financial institutions' foreign currency funding largely relies on funding through financial markets. However, financial institutions have a liquidity buffer that can cover funding shortages, even if market funding becomes difficult for a certain period. With respect to the foreign currency investment and funding structure of major banks, a large proportion of foreign currency investments consist of loans and foreign bonds with relatively long maturities, whereas a large share of foreign currency funding consists of market funding, such as repos, FX and currency swaps, and interbank borrowings (Chart IV-3-2). Looking at changes in balance sheets over the past year, however, increases in lending and increases in client-related deposits have been in line with each other.

Chart IV-3-2: Major banks' foreign currency-denominated balance sheet

bil. U.S. dollars

Assets		Liabilities	
Loans	914 (+68)	Client-related deposits	572 (+55)
		of which: financial institutions' deposits	130 (-)
		Corporate bonds, etc.	118 (+19)
Interbank investments	262 (-2)	Medium- to long-term FX and currency swaps	136 (-30)
		Short-term FX and currency sw aps	64 (-5)
Securities	344 (-59)	Repos	221 (-45)
		Interbank funding	467 (+28)
Others	86 (+9)	of w hich: CD and CP	237 (-3)
		Others	30 (-7)
Total	1,606 (+17)	Total	1,609 (+15)

Note: 1. Data as at end-July 2017.
Figures in parentheses indicate the change from end-July 2016 to end-July 2017.

2. Covers major banks classified as internationally active banks.

Source: BOJ.

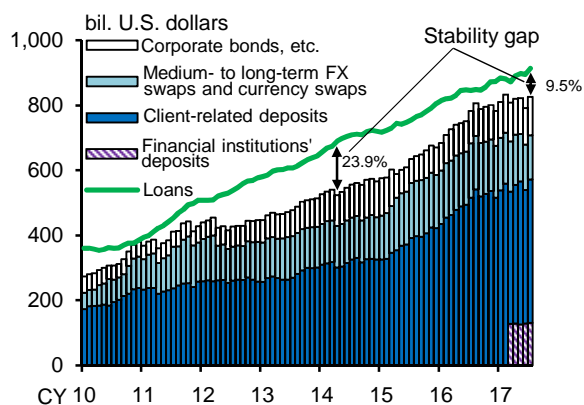
In assessing the stability of the investment and funding structure of foreign currencies, the "stability gap" -- the gap between the amount of illiquid loans and stable funding through, for example, client-related deposits, medium- to long-term FX and currency swaps, and corporate bonds -- serves as a useful indicator. **For major banks, this stability gap has continued on a narrowing trend. The reason is that banks -- amid continuing increases in lending -- have endeavored to bolster their funding bases through increasing client-related deposits and the issuance of corporate bonds** (Chart IV-3-3). Nevertheless, to some extent, a gap still remains, and there are uncertainties regarding the stickiness of client-related deposits, uncertainties surrounding the liquidation of foreign currency-denominated assets, and the risk of a rapid withdrawal of unused committed lines (Chart IV-3-4). Therefore, it is important for banks to continue their efforts to shore up the stability of their foreign currency funding sources. In particular, given that about a quarter of client-related deposits consist of deposits by financial institutions, which have relatively low stickiness, it is necessary to carefully manage the risk of outflows, giving due consideration to the characteristics of each depositor.²³ **For regional banks, there is large variation in the stability gap, and those that have been actively accumulating foreign currency-denominated assets or have increased their dependence on short-term funding have a correspondingly large gap** (Chart IV-3-5). These banks need to continue to make efforts to reduce the stability gap, for example by bolstering stable funding bases.

As for the resilience of foreign currency funding to short-term stress, both major banks and regional banks generally hold sufficient liquid assets to cover the expected outflow of

²³ For instance, assuming more stringent conditions that do not consider deposits by financial institutions as stable funding, the latest figure for the "stability gap" of major banks worsens from 9.5 percent to 23.8 percent.

funds under a stress situation (Chart IV-3-6).²⁴ However, contingent factors for financial institutions, such as withdrawals from unused committed lines and/or outflows from client-related deposits, account for a certain share of outflows of funds. Taking such situation into account, in their management of funding liquidity risk for foreign currencies, financial institutions need to make efforts to improve the effectiveness of their response to market stresses by carefully controlling

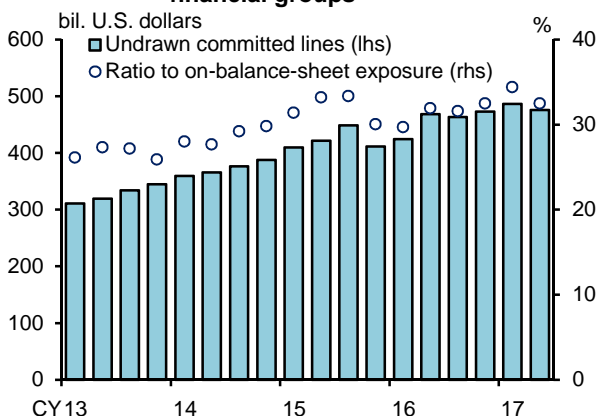
Chart IV-3-3: Stability gap among major banks



- Note: 1. Latest data as at end-July 2017.
 2. Covers major banks classified as internationally active banks.
 3. "Corporate bonds, etc." and "Medium- to long-term FX swaps and currency swaps" indicate funding maturing in over 3 months until March 2012 and funding maturing in over 1 year from April 2012. "Client-related deposits" includes "Financial institutions' deposits" until February 2017.
 4. The figures in the chart indicate the ratios of the gaps to the loans (as at end-April 2014 and end-July 2017).

Source: BOJ.

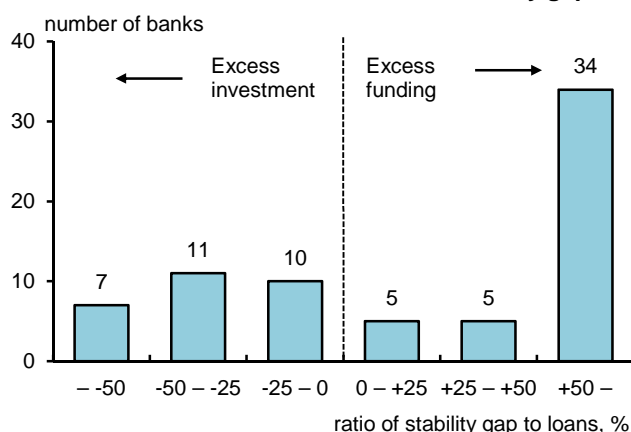
Chart IV-3-4: Committed lines among the three major financial groups



- Note: 1. Latest data as at end-June 2017.
 2. The data are based on international claims including cross-border claims and local claims of foreign offices (ultimate risk basis).

Source: BOJ.

Chart IV-3-5: Stability gap among regional banks



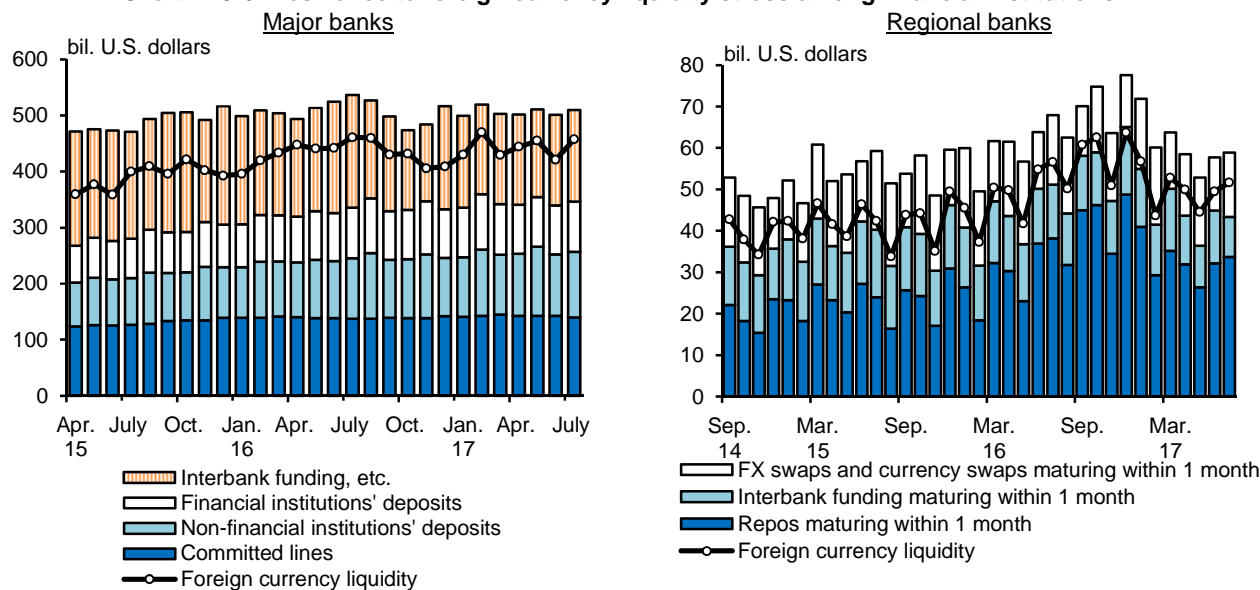
- Note: 1. Latest data as at end-March 2017.
 2. Covers 72 regional banks that have foreign currency-denominated loans.
 3. Stability gap = client-related deposits (excluding financial institutions' deposits) + medium- to long-term FX swaps and currency swaps + corporate bonds, etc. - loans. "Medium- to long-term FX swaps and currency swaps" and "corporate bonds, etc." cover funding maturing in over 1 year.

Source: BOJ.

²⁴ In Chart IV-3-6, the classification methods of fund inflows/outflows differ between the left- and right-hand charts due to the limitation of data. From this *Report* onward, in the left-hand chart, the following assumptions with regard to assets and liabilities with remaining maturities of up to 1 month (including those with no specific maturity) are made: (1) the total amount of deposits by financial institutions and interbank funding (excluding central bank funding) is withdrawn; (2) 40 percent of deposits by non-financial institutions and central bank funding in interbank funding are withdrawn; (3) 30 percent of unused committed lines are withdrawn; and (4) 50 percent of loans are regarded as foreign currency liquidity. Repo borrowings are included neither in fund outflows nor in foreign liquid assets in the left-hand chart. In the right-hand chart, all repo borrowings with remaining maturities of 1 month or less are classified as foreign liquid assets, based on the assumption that the collateral used is of high quality. At the same time, the right-hand chart does not account for withdrawals from unused committed lines and/or outflows from client-related deposits.

liquidity risk given the attributes of their assets and liabilities.

Chart IV-3-6: Resilience to foreign currency liquidity stress among financial institutions



- Note: 1. The left-hand chart covers major banks classified as internationally active banks.
 2. Latest data as at end-July 2017.
 3. Foreign currency liquidity in the left-hand chart = interbank investments + 50 percent of loans + FX swaps and currency swaps + unencumbered securities. Data excluding "unencumbered securities" indicate assets maturing within 1 month or with no specific maturity. "Financial institutions' deposits" up to end-February 2017 are estimated based on the proportion of financial institutions' deposits to non-financial institutions' deposits from end-March 2017.
 4. Foreign currency liquidity in the right-hand chart = cash + deposits + unencumbered U.S. Treasuries + repos maturing within 1 month.

Source: BOJ.

Foreign currency funding environment

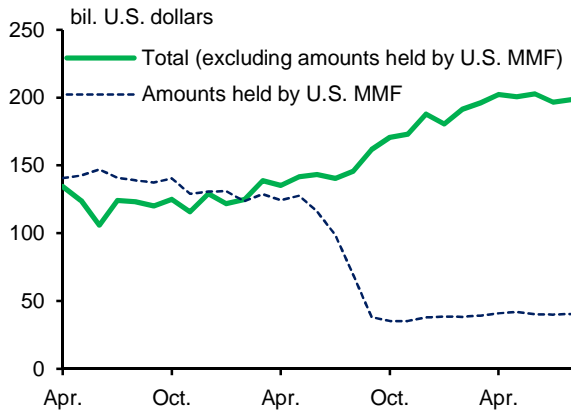
In FX and currency swap markets, U.S. dollar funding premiums, which had been on an upward trend since around 2015, peaked at the end of 2016 and have declined since then (Chart II-2-2). Moreover, in the market for dollar-denominated CDs and CP, the issuance of those purchased by Prime money market funds (MMFs) had decreased substantially in the wake of the MMF reform in October 2016; however, the issuance environment has been improving as direct purchases by ultimate investors have gradually increased (Chart IV-3-7).

However, against the background of the difference in growth rates and yields between the Japanese and overseas economies, the appetite of Japanese financial institutions and institutional investors for investment in overseas assets remains strong. It is therefore likely that dollar funding premiums through FX and currency swaps will tend to experience upward pressure under a stress situation. Major banks, which have a wider range of dollar funding means, have accumulated client-related deposits in order to ensure dollar funding stability and have avoided utilizing comparatively expensive FX and currency swaps as a funding tool, especially since the start of 2017 (Chart IV-3-8). However, the amount of dollar funding through FX and currency swaps by Japanese financial institutions overall is still on an uptrend. This mainly reflects the increase in funding demand by regional banks and insurance companies, which do not have a wide range of options to secure dollar funding compared to major banks.

Meanwhile, the proportion of loans denominated in local currencies continues to increase, especially in the Asian region (Chart IV-3-9). While loan-to-deposit ratios have generally declined reflecting the fact that deposits have increased at a faster pace than loans, banks' dependence on market funding remains high in several currencies (Chart IV-3-10). Because liquidity in local

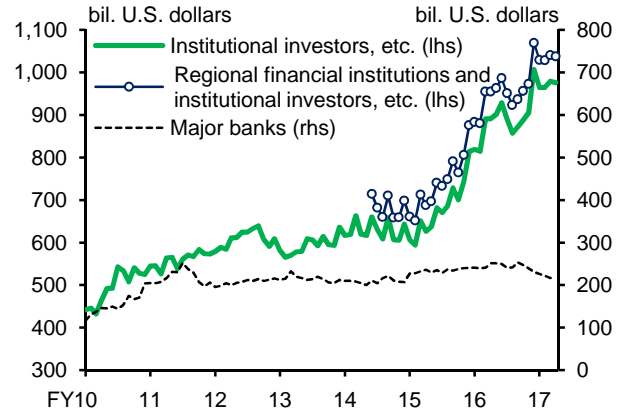
currency funding markets is relatively low, financial institutions need to continue to make efforts to bolster stable funding bases through, for example, making committed lines with local banks and utilizing medium- and long-term funding means (swaps, capital, etc.).

Chart IV-3-7: Outstanding amounts of foreign currency-denominated CD and CP issued by major banks



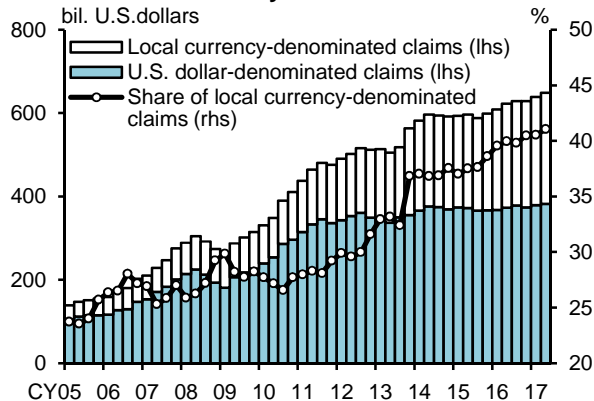
Note: 1. Latest data as at end-August 2017.
2. Covers five major banks.
Source: Crane Data; BOJ.

Chart IV-3-8: Amount of foreign currency funding via FX swaps and currency swaps by Japanese financial entities



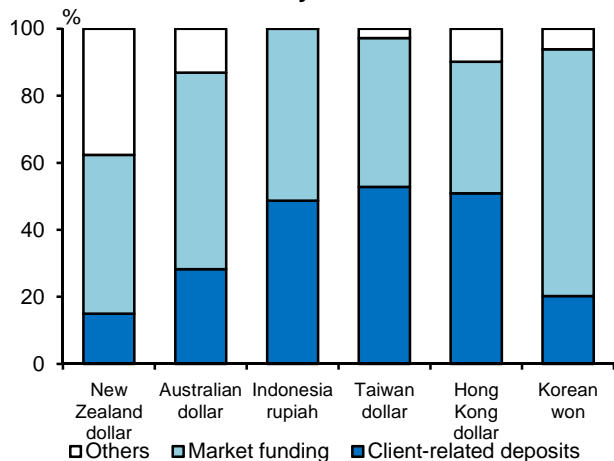
Note: 1. Latest data as at end-July 2017.
2. "Institutional investors" covers Japan Post Bank, The Norinchukin Bank, Shinkin Central Bank (from end-September 2014), and life insurance companies. Life insurance companies are members of the Life Insurance Association of Japan (latest data on members shows 41 companies).
Source: Bloomberg; The Life Insurance Association of Japan; Published accounts of each company; BOJ.

Chart IV-3-9: Japanese banks' claims in Asia by currency



Note: 1. Latest data as at end-June 2017.
2. "U.S. dollar currency-denominated claims" includes not only local currency-denominated cross-border claims but also foreign currency except for U.S. dollar-denominated claims.
Source: BIS, "Consolidated banking statistics"; BOJ, "BIS international consolidated banking statistics in Japan."

Chart IV-3-10: Major banks' funding structure by currency



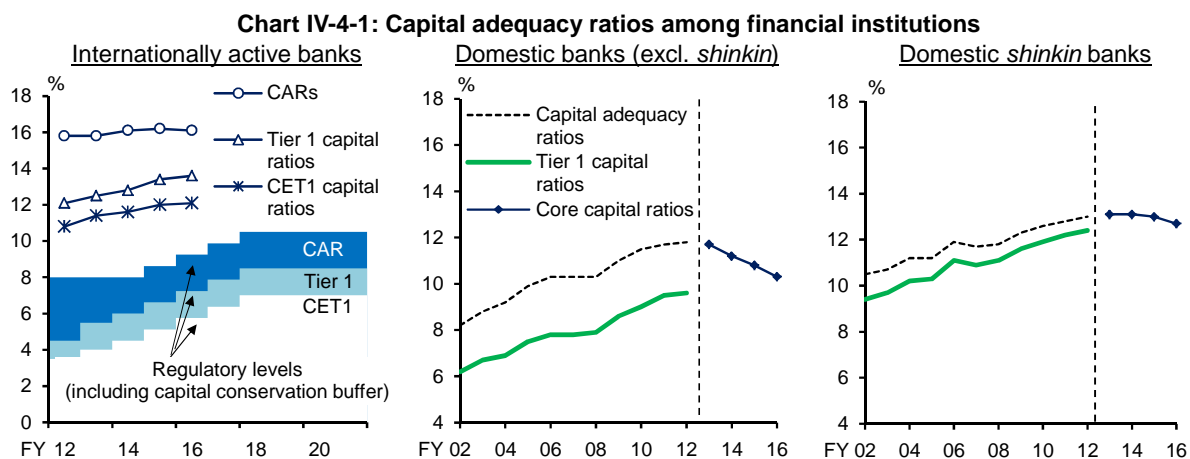
Note: 1. Data as at end-June 2017.
2. Covers five major banks' main funding sources. The top six currencies with their highest loan-to-deposit ratios are selected according to the latest data.
Source: BOJ.

D. Financial institutions' capital adequacy

This section assesses whether financial institutions' capital adequacy ratios are above the regulatory requirements, and examines whether they maintain a sufficient capital base against the various risks they undertake.

Capital adequacy ratios

Financial institutions' capital adequacy ratios are sufficiently above the regulatory requirements. As at the end of fiscal 2016, total capital adequacy ratios, Tier 1 capital ratios, common equity Tier 1 capital ratios (CET1 capital ratios) at internationally active banks, and core capital ratios at domestic banks significantly exceeded the regulatory requirements (Chart IV-4-1).



Note: 1. CAR stands for total capital adequacy ratios. Latest data as at end-March 2017.

2. Classifications of internationally active banks and domestic banks (both of them are calculated on a consolidated basis) are as at each time point for Basel III's regulatory ratios, and are as at end-fiscal 2013 for regulatory ratios before Basel III. Data take the phase-in arrangements into consideration.

Source: BOJ.

However, it should be borne in mind that international financial regulations, such as the Basel III framework, will gradually be implemented in full, and some issues, such as the methodology for the calculation of risk-weighted assets, involve new content on regulations that has yet to be finalized.²⁵

Capital adequacy relative to the amount of risk borne by financial institutions

The amount of risk borne by major banks and regional banks has decreased somewhat, mainly reflecting the decline in market risk associated with stockholdings, while the amount of risk borne by *shinkin* banks is largely unchanged (Chart IV-4-2).²⁶ **Financial institutions' capital levels are generally adequate relative to the amount of risk they undertake, and it can be judged that financial institutions currently have sufficient capacity to absorb losses and to take on risks.**

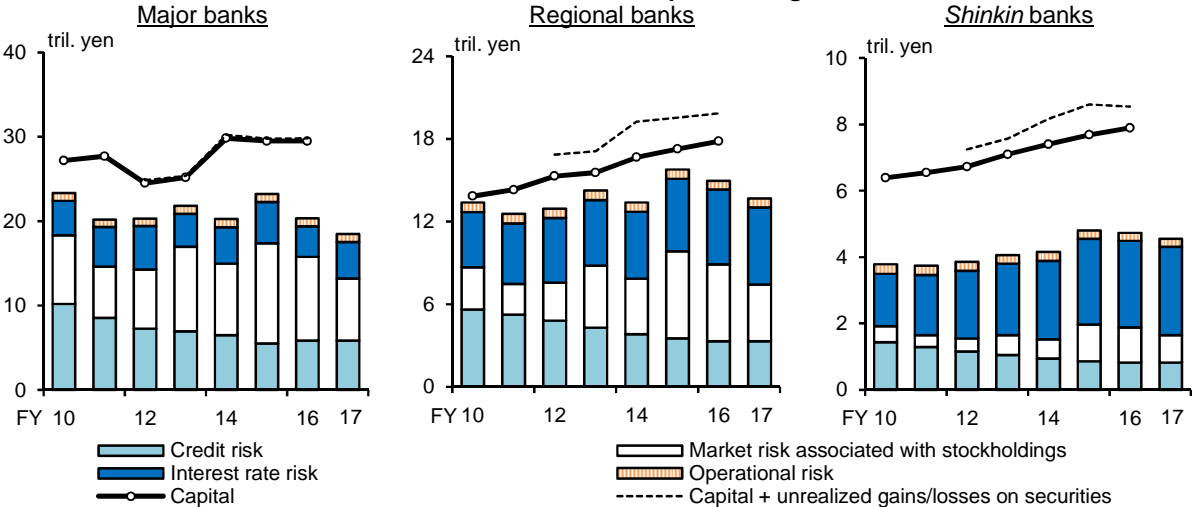
At domestic banks, unrealized gains/losses on securities effectively serve as a buffer of profits or

²⁵ As for internationally active banks, under the Basel III requirements, (1) the capital conservation buffer (2.5 percent), (2) the countercyclical capital buffer (upper limit of 2.5 percent), and (3) the surcharge on global systemically important banks (G-SIBs) of 1-2.5 percent (determined according to their size and other characteristics) started to be implemented at the end of March 2016 and will become fully effective at the end of March 2019. Under the current phase-in arrangements, domestic banks can regard all or a portion of certain instruments (such as non-convertible preferred stocks and subordinated bonds) as part of new core capital, and they are allowed not to exclude certain assets (such as goodwill) from core capital. These arrangements will be phased out gradually. The moderate decline in the core capital ratios of domestic banks observed in Chart IV-4-1 is due to the gradual phasing out of the effects of these arrangements.

²⁶ Common methods and parameters (such as the confidence level and the holding period) are used to calculate the amount of risk borne by all financial institutions. Thus, the amount of risk presented here does not necessarily match the sum of those calculated internally by financial institutions as part of their risk management process. For the calculation methods used for each type of risk, see the notes in Charts IV-1-1, IV-2-5, IV-2-6, and IV-2-11. The amount of operational risk is assumed to correspond to 15 percent of gross operating profits.

capital although they are not reflected in the capital adequacy ratio on a regulatory basis. In fact, financial institutions that hold a large amount of unrealized gains on securities tend to take a more active risk-taking stance.²⁷ Meanwhile, some regional financial institutions have posted substantial profits on the sale of securities amid a decline in their pre-provision net revenue (excluding trading income), and in their net income the share of realized gains from the sale of securities has increased in recent years. Therefore, regional financial institutions' unrealized gains on securities holdings have recently been maintained at a high level on the whole, but those for some banks have already become small. Looking ahead, structural downward pressure will continue to be exerted on regional financial institutions' profitability due to the shrinking of their business bases through population decline and other factors. If regional financial institutions continue to compensate for the decline in profitability with the realization of gains through sales of securities, their unrealized gains on securities are likely to decrease. This could reduce their capital buffer, and eventually affect their risk-taking ability. Thus, this point warrants careful vigilance.

Chart IV-4-2: Risks borne and amount of capital among financial institutions



Note: 1. As for the data for fiscal 2017, (1) credit risk, foreign currency interest rate risk (excluding the risk associated with foreign currency-denominated bondholdings) and operational risk are assumed to be unchanged from end-March 2017, and the following data are estimated: (2) market risk associated with stockholdings and interest rate risk associated with yen- and foreign currency-denominated bondholdings as at end-July 2017; and (3) yen interest rate risk (excluding the risk associated with yen-denominated bondholdings) as at end-June 2017.
 2. "Credit risk" includes risks of foreign currency-denominated assets. "Market risk associated with stockholdings" includes stock investment trusts. "Market risk associated with stockholdings" and "Interest rate risk" (off-balance-sheet transactions are partly included) at major banks include foreign currency-denominated risk.
 3. "Capital + unrealized gains/losses on securities" is the sum of capital and unrealized gains/losses on securities (tax effects taken into account) for domestic banks.

Source: BOJ.

²⁷ For details, see Box 5 in the April 2017 issue of the Report.

V. Macro stress testing

This chapter assesses the stability of the financial system through macro stress testing. Macro stress testing examines the resilience of the financial system dynamically by estimating the extent of capital losses that would be incurred by financial institutions under specific hypothetical stress events.

The stress scenario under consideration is the "tail event scenario." In particular, the assumed economic and financial conditions are comparable to those observed at home and abroad during the turmoil after the failure of Lehman Brothers (the Lehman shock). This scenario is applied in every semiannual report. Since the simulation assumes economic conditions comparable to those observed during the Lehman shock, the more overheated the recent economic conditions are, the greater the degree of the stress to be applied. In other words, the degree of the stress is calibrated countercyclically in examining the resilience of the financial system against the stress and financial institutions' capital adequacy. In addition, as financial institutions' risk profiles and financial bases change from time to time, the impact of the stress on the financial system could vary even if placed under financial and economic stress of the same magnitude. The scenario presented in this stress testing exercise is a hypothetical one that is developed for the purpose of effectively conducting the above-mentioned examination and analysis. It should be noted that the scenario presented is not an indication of the likelihood of outcomes for the economy, asset prices, or other factors, nor should they be interpreted as the Bank of Japan's outlook.

The subjects of the stress test are 115 banks and 255 *shinkin* banks (accounting for approximately 80 to 90 percent of total credit outstanding), and the duration of stress is assumed to be 2.5 years, from October-December 2017 through January-March 2020. The simulation utilizes the Financial Macro-econometric Model (FMM) developed by the Financial System and Bank Examination Department of the Bank.²⁸ The results of macro stress testing in this round, as in the previous rounds, indicate that **the financial system has generally strong resilience against economic and financial shocks originating from home and abroad.** In the following sections, we discuss the procedure and results of the stress testing exercise.²⁹

The previous issues of the *Report* examined, in addition to the tail event scenario, the "tailored event scenario," which was designed for analyzing the possible vulnerabilities inherent in the financial system under different "acute" stresses from a multi-dimensional perspective. Instead, this *Report* presents detailed analyses of how Japan's financial system is affected by "chronic" stresses such as a persistent decline in population and the number of firms (see Chapter VI).

1. Baseline scenario

The baseline scenario is designed to serve as a benchmark for the assessment of the simulation results under the stress scenario. Based on baseline forecasts by the market and various organizations, the scenario assumes that "Japan's economy continues its moderate expansion, supported by accommodative financial conditions, as the growth rates of overseas economies -- both advanced and emerging -- increase moderately." In addition, JGB yields evolve, more or less in line with the implied forward rates priced into the yield curve as at late July 2017.

²⁸ For more details, see Tomiyuki Kitamura, Satoko Kojima, Koji Nakamura, Kojiro Takahashi, and Ikuo Takei, "Macro Stress Testing at the Bank of Japan," BOJ Reports & Research Papers, October 2014.

²⁹ The major economic variables for the baseline scenario and the tail event scenario can be downloaded from the Bank's website at <http://www.boj.or.jp/en/research/brp/fsr/fsr171023.htm/>.

The baseline simulation results are as follows. The loans outstanding among financial institutions continue to increase, and net interest income remains more or less unchanged, as the economies of Japan and overseas expand moderately (Charts V-1-1 and V-1-2). Credit costs remain at low levels, against the backdrop of the favorable financial conditions of firms (Chart V-1-3). As a result, capital adequacy ratios at both internationally active banks and domestic banks remain well above the regulatory requirements throughout the simulation period (Chart V-1-4).³⁰

Chart V-1-1: Loans outstanding (tail event scenario)

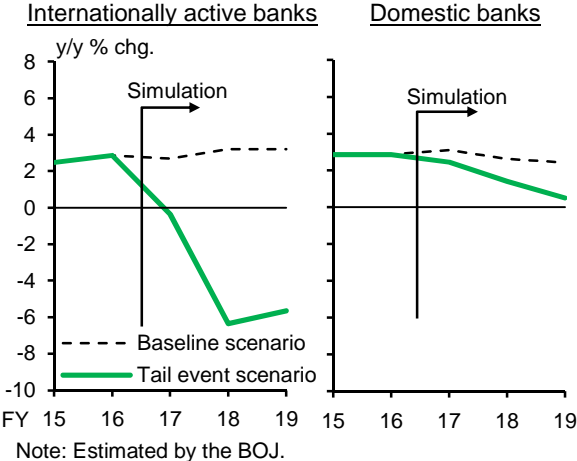


Chart V-1-2: Net interest income (tail event scenario)

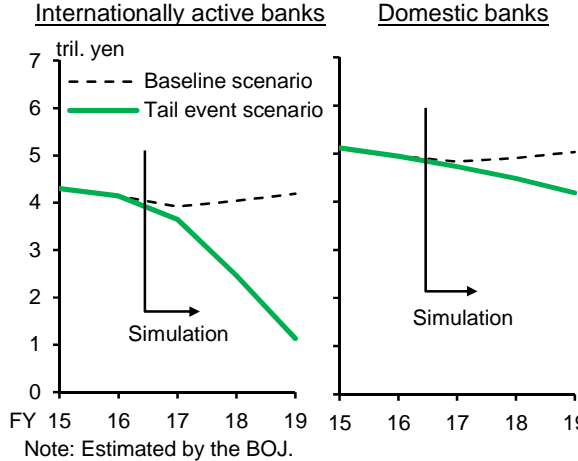


Chart V-1-3: Credit cost ratio (tail event scenario)

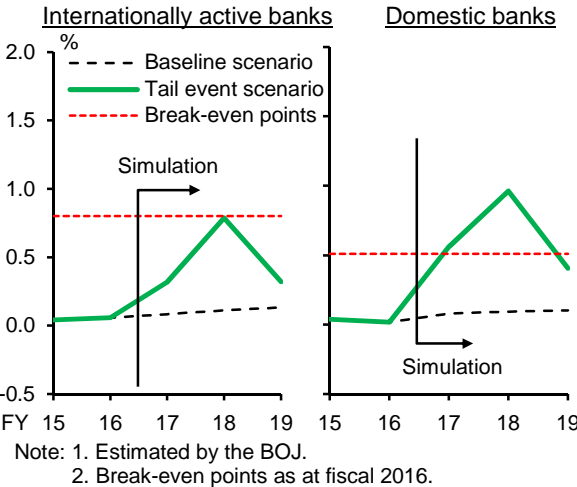
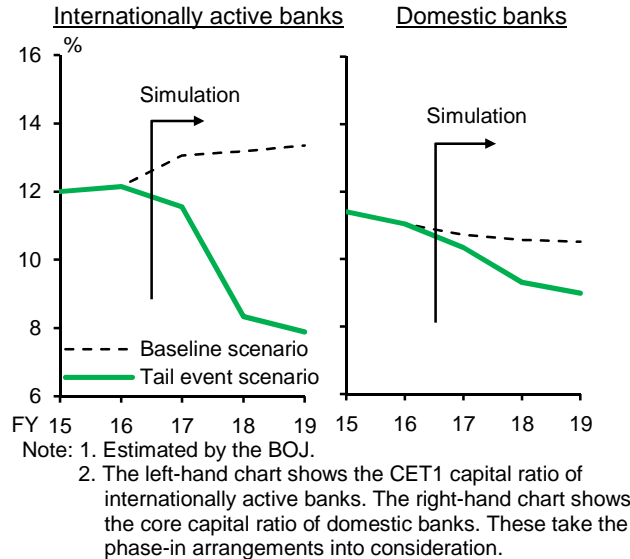


Chart V-1-4: CET1 capital ratio and core capital ratio (tail event scenario)



2. Tail event scenario

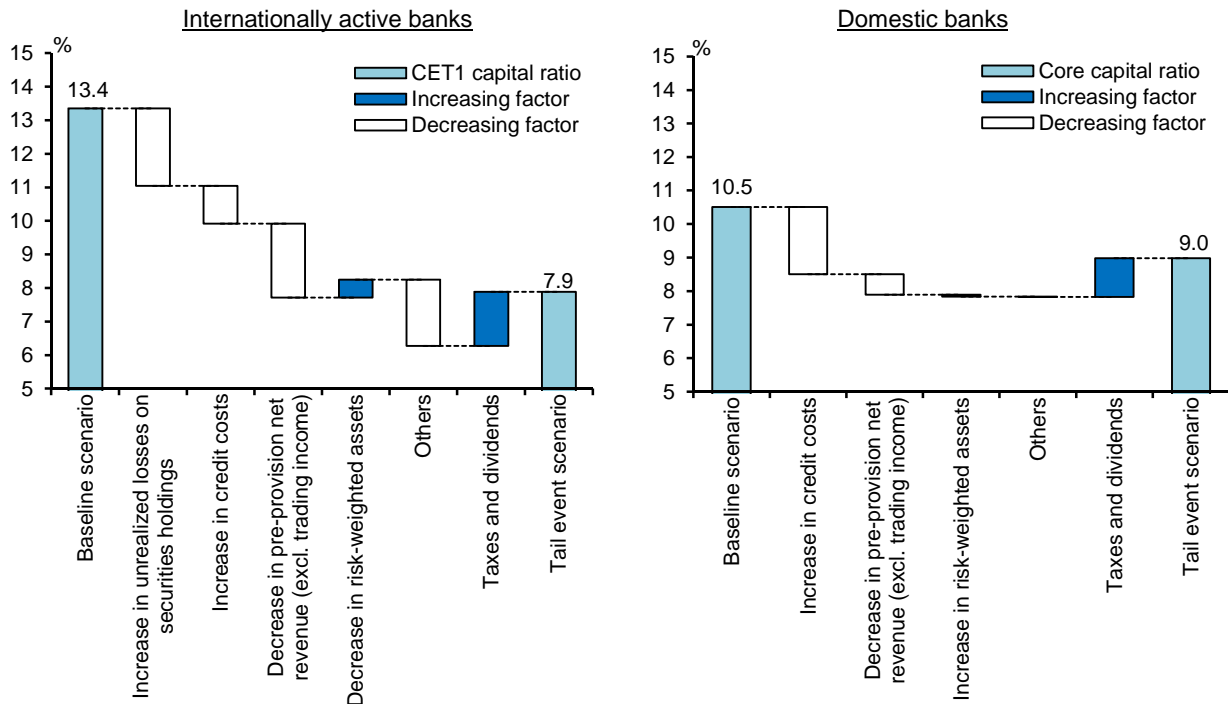
The tail event scenario envisages a situation whereby "Japan's output gap deteriorates to a level comparable to that seen during the Lehman shock." It also assumes that a significant economic slowdown occurs abroad, and financial markets are buffeted by a substantial decline in stock

³⁰ The moderate decline in the core capital ratios of domestic banks is due to the gradual phasing out of the effects of transitory arrangements adopted during the transition to new regulatory requirements for the calculation of their capital adequacy ratios.

prices (TOPIX), an appreciation of the yen against the U.S. dollar, and a decline in JGB yields.

The simulation results based on this scenario are as follows. The year-on-year growth rate of loans outstanding falls due to a tighter lending stance reflecting a decline in profitability and the capital adequacy ratio as well as subdued demand for funds reflecting an economic downturn (Chart V-1-1). In particular, the total amount of loans decreases sharply at internationally active banks, as their overseas loans decline substantially in yen terms partly due to the effects of yen appreciation. Net interest income decreases substantially at internationally active banks, mainly due to the significant decline in overseas loans. Net interest income also decreases moderately at domestic banks, where overseas loans account for a smaller proportion of total loans (Chart V-1-2). In the corporate sector, financial conditions deteriorate due to a significant downturn in economic conditions both at home and abroad. As a result, credit cost ratios at internationally active banks increase to levels around their break-even points, while credit cost ratios at domestic banks rise to levels well above their break-even points (Chart V-1-3). In addition, internationally active banks incur unrealized losses on securities holdings in response to declines in stock prices at home and abroad, and see a decrease in net non-interest income, including fees and commissions for sales of investment trusts.³¹

Chart V-1-5: Decomposition of the CET1 capital ratio and the core capital ratio (tail event scenario)



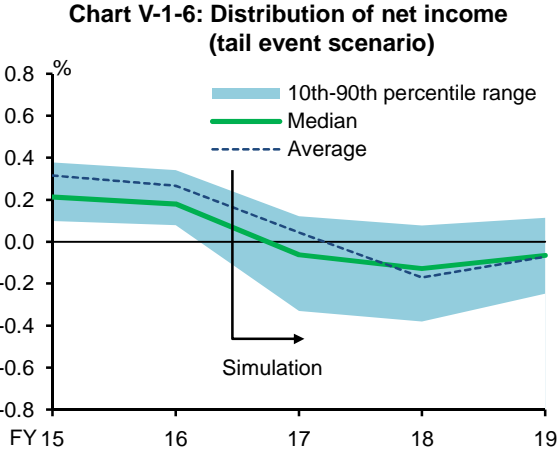
- Note: 1. Estimated by the BOJ.
 2. "Increase in unrealized losses on securities holdings" takes tax effects into account. Data for end-March 2020.
 3. The left-hand chart shows the CET1 capital ratio of internationally active banks. The right-hand chart shows the core capital ratio of domestic banks. These take the phase-in arrangements into consideration.

At internationally active banks, the capital adequacy ratio falls by 5.5 percentage points compared to the baseline scenario, due to a decrease in pre-provision net revenue (excluding trading income) and an increase in unrealized losses on securities holdings. However, on average, the capital adequacy ratio still remains above the regulatory requirements (Charts V-1-4 and V-1-5).

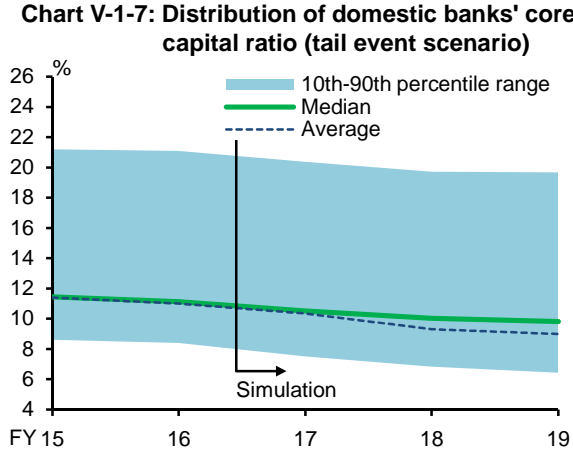
³¹ Until the last round of the simulation, net non-interest income was assumed to remain constant at the latest value. In this round, the model is refined so that major banks' net non-interest income fluctuates with the economic conditions. As a result, at internationally active banks, which include a number of major banks, the CET1 capital ratio under the tail event scenario falls by 0.5 percentage points compared to the baseline scenario, reflecting a decrease in net non-interest income.

The capital adequacy ratio for domestic banks declines by 1.5 percentage points, mainly due to an increase in credit costs, but remains well above the regulatory requirements.

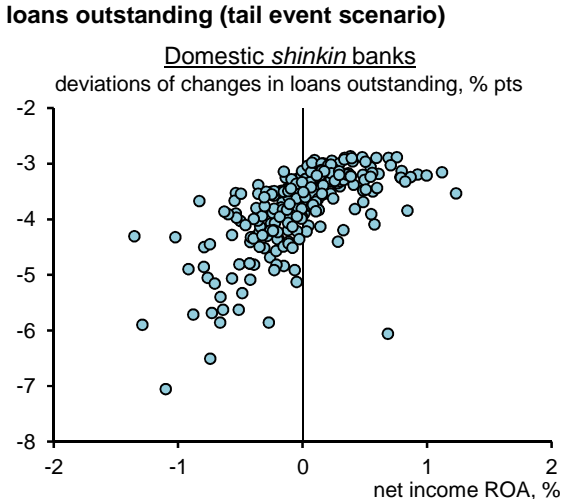
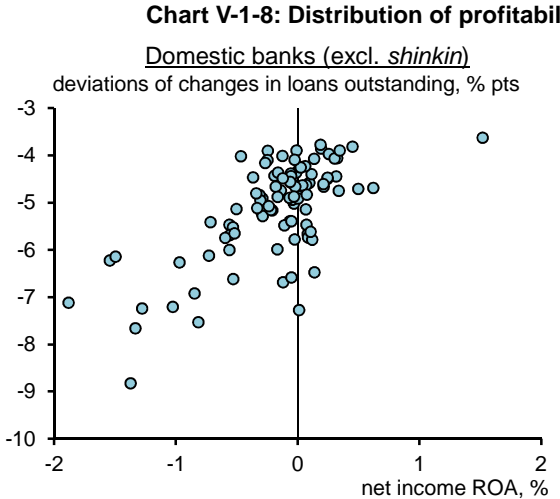
However, those results present the averages of financial institutions, and it should be noted that there is some heterogeneity among financial institutions with regard to net income and capital adequacy ratios in the stress situation (Charts V-1-6 and V-1-7). The simulation results show that about 80 percent of financial institutions temporarily record net losses. Even for financial institutions whose capital adequacy ratios are above the regulatory requirements, their stance toward risk taking could tighten, for instance, when net losses in their financial statements or unrealized losses on securities holdings are incurred. This could in turn adversely affect the financial intermediation function. In fact, the results indicate that financial institutions that record net losses tighten their lending stance to a greater extent (Chart V-1-8).



Note: 1. Estimated by the BOJ.
2. The vertical axis shows the ratio of net income to total assets.



Note: Estimated by the BOJ.



Note: 1. Estimated by the BOJ.
2. The vertical axis shows how the cumulative changes in loans outstanding to domestic firms from end-March 2017 to end-March 2020 deviate from the baseline scenario. Net income ROA = (cumulative net income from fiscal 2016 to fiscal 2018) / (total assets in fiscal 2018).

VI. Financial institutions' profitability and potential vulnerability of the financial system

As seen in Chapters IV and V, **at present, financial institutions have sufficient capital bases, which allow them to continue risk taking even if profitability faces downward pressure for the time being.** Financial institutions' portfolio rebalancing through more active lending has been contributing to an improvement in economic developments, and if this leads to more proactive economic activities by firms and households, this in turn is likely to bring about a recovery in financial institutions' profitability.³²

However, it is necessary to pay attention to the possibility that financial imbalances will build up and financial system stability will be impaired, if financial institutions shift toward excessive risk taking in order to maintain profitability as deposit and lending margins continue on a narrowing trend. On the other hand, if there is an increase in the number of financial institutions whose loss-absorbing capacity declines due to the continued weakening of their profitability, the financial intermediation function could weaken, adversely affecting the real economy. As such, **regarding potential vulnerabilities due to the declining profitability of financial institutions, it is necessary to examine both the risk of overheating -- excessive accumulation of macro risks and exuberant asset prices -- and the risk of a gradual pullback in financial intermediation due to a persistent decline in profits.**

Based on these considerations, this chapter examines financial institutions' recent profitability and then assesses potential vulnerabilities in the financial system through an international comparison of financial institutions' profit structures and an analysis of the intensified competition among financial institutions.

A. Developments in financial institutions' profits

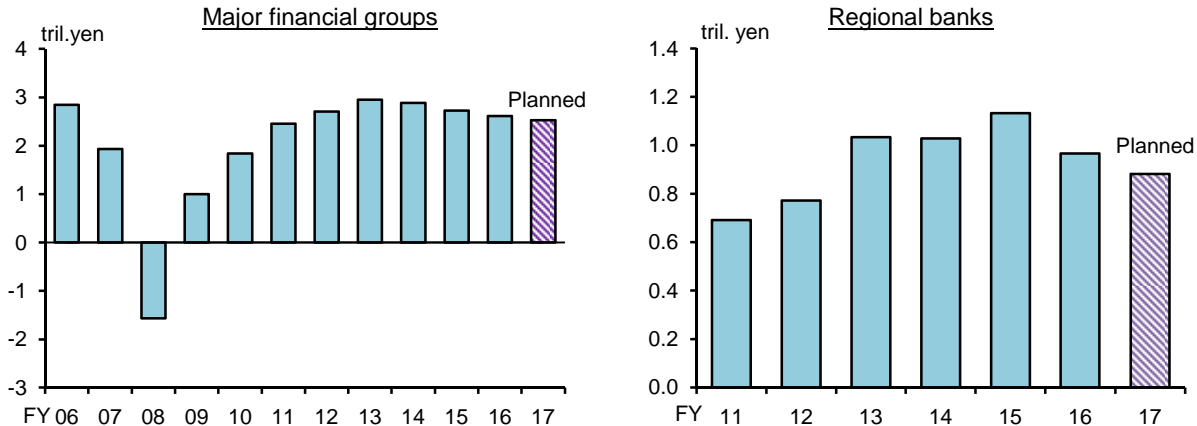
Although financial institutions' profits remain at a fairly high level from a long-term perspective, both major banks' and regional financial institutions' net income declined in fiscal 2016 (Charts VI-1-1 and VI-1-2). Factors contributing to the decline in net income include, first, a decline in domestic net interest income, which reflects the further narrowing of lending margins under the continued low interest rate environment and the intensified competition among financial institutions (Chart VI-1-3). While many financial institutions -- reflecting active lending attitudes -- have increased the amount of loans outstanding, this has been insufficient to offset the impact of the narrowing of lending margins (Chart VI-1-4). Another factor underlying the decrease in net income is the deterioration in realized gains/losses on bondholdings, reflecting mounting losses on sales of U.S. Treasuries amid the rise in U.S. interest rates. In addition, for regional financial institutions, a decrease in profits from fees and commissions due to poor sales of investment trusts and insurance products has contributed to the decline in net income.

According to financial institutions' business plans, net income is expected to decrease in fiscal 2017 as well. Looking at the effect of negative interest rates on loan interest rates, while the downward pressure on interest rates seems to have already run its course in the case of market interest rate-linked loans that are subject to interest rate renewal every few months, the effects of the decline in interest rates at the time of rollover can be expected to continue in the case of

³² In Box 2 in the April 2017 issue of the *Report*, using microdata from the *Tankan* (Short-Term Economic Survey of Enterprises in Japan), it was shown that banks' increasingly active lending stance was leading to an improvement in firms' business sentiment.

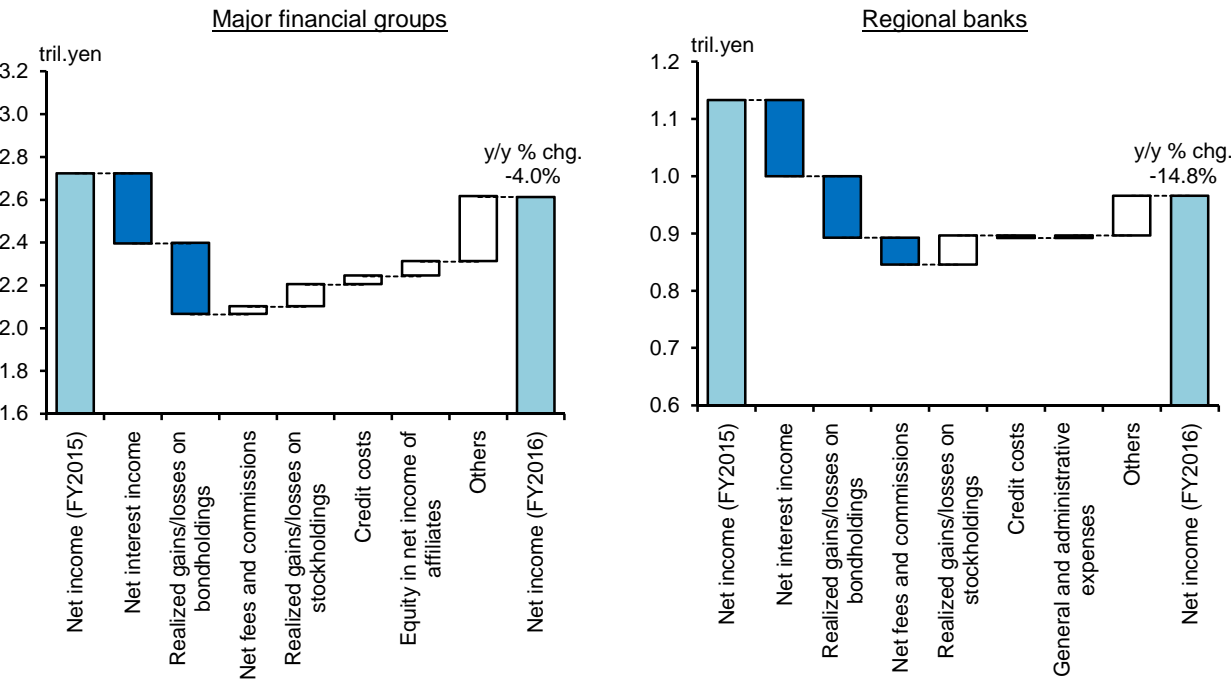
fixed-rate loans with a lending term of several years. By type of bank, for major banks whose market interest rate-linked loans make up a large share of total loans, the impact of the decline in domestic net interest income on net income overall is expected to wane as overseas net interest income and fees and commissions account for a relatively large share of their overall net income. Moreover, among major banks, many are planning to expand M&A deals and hybrid financing, and they continue to aim at overseas business expansion. On the other hand, for regional financial institutions, which are greatly dependent on domestic net interest income, the share of fixed-rate loans is high, and it is thus expected that downward pressure on deposit and lending margins will continue going forward (Chart III-1-18). Against this backdrop, many regional financial institutions are seeking to bolster their fee and commission-based business, which is less susceptible to interest rate swings, and more than a few are planning cost reduction and the realization of gains through sales of securities.

Chart VI-1-1: Net income



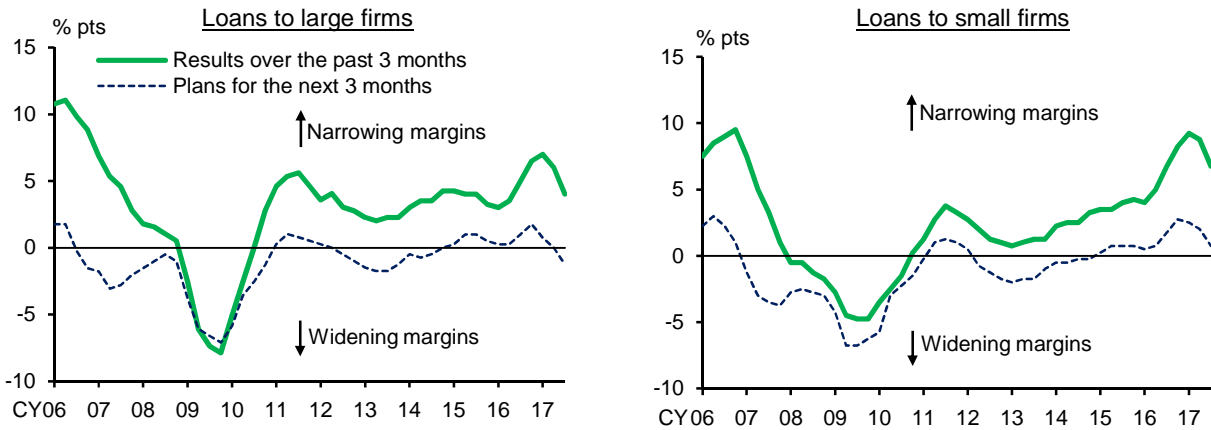
Note: "Major financial groups" covers Mizuho Financial Group, Mitsubishi UFJ Financial Group, Sumitomo Mitsui Financial Group, Resona Holdings, Sumitomo Mitsui Trust Holdings, Shinsei Bank, and Aozora Bank.
 Source: Nikkei NEEDS; Published accounts of each bank; BOJ.

Chart VI-1-2: Decomposition of change in net income from the previous year



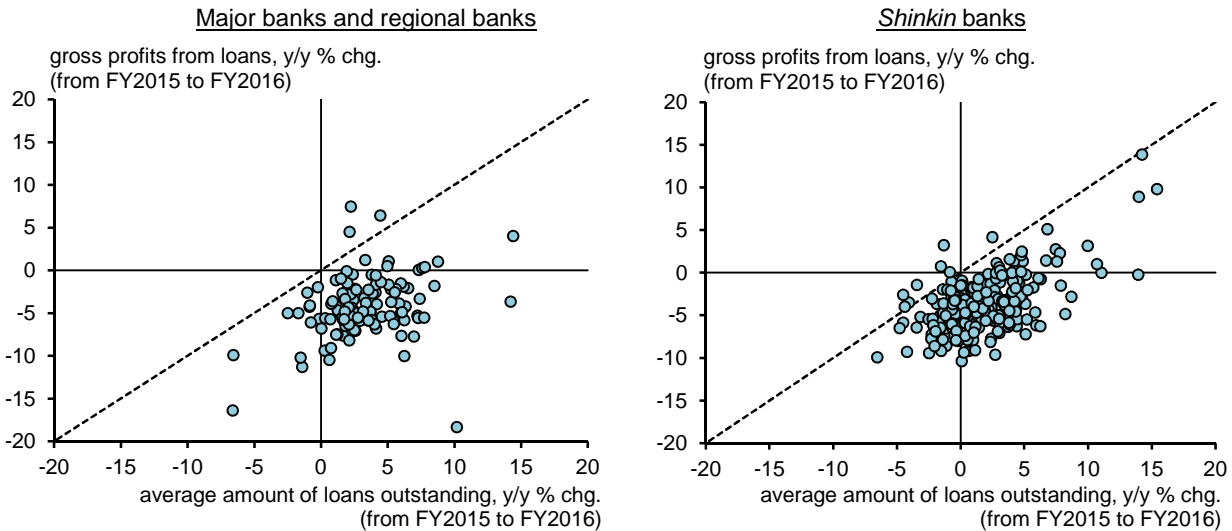
Note: "Major financial groups" covers Mizuho Financial Group, Mitsubishi UFJ Financial Group, Sumitomo Mitsui Financial Group, Resona Holdings, Sumitomo Mitsui Trust Holdings, Shinsei Bank, and Aozora Bank.
 Source: Published accounts of each bank.

Chart VI-1-3: DI for lending margins: plans and results



Note: 1. Latest data as at July 2017. 4-quarter backward moving averages.
 2. Based on the proportion of responding financial institutions selecting each given choice, the DI is calculated as follows:
 $DI = \text{"narrowing considerably"} + 0.5 * \text{"narrowing somewhat"} - 0.5 * \text{"widening somewhat"} - \text{"widening considerably"}.$
 Source: BOJ, "Senior loan officer opinion survey on bank lending practices at large Japanese banks."

Chart VI-1-4: Relationship between changes in loans outstanding and profits from loans



Note: 1. The average amount of loans outstanding excludes foreign currency-denominated impact loans.
 2. Gross profits from loans = (average amount of loans outstanding) * (lending margins).
 3. Major banks and regional banks cover their domestic business sector only.
 Source: BOJ.

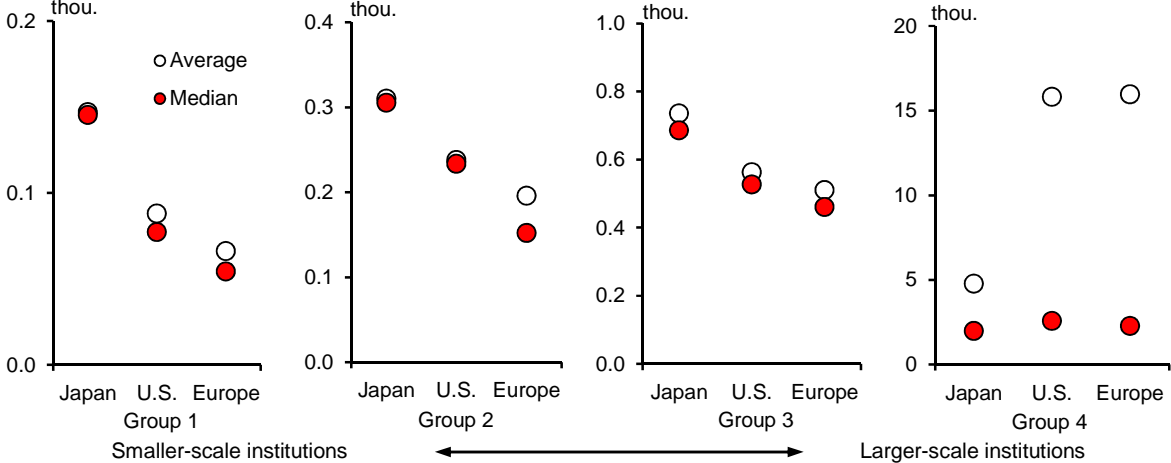
B. Structure of financial institutions' profits: low net non-interest income ratio

The decline in financial institutions' profits is a phenomenon that can be observed not only in Japan but commonly in advanced economies, where the low interest rate environment has prevailed. However, even in this situation, **the low profitability of Japanese financial institutions is striking from an international perspective.** Regional financial institutions in particular have a larger number of employees and lower gross operating profits per employee than U.S. and European financial institutions of a similar size (Charts VI-2-1 and VI-2-2).³³ Moreover,

³³ In Charts VI-2-1 to VI-2-5, the analysis includes 370 Japanese financial institutions (consisting of major banks, regional banks, and *shinkin* banks), 686 U.S. financial institutions, and 491 European financial institutions from the euro area, the United Kingdom, and Switzerland. In principle, data are calculated on a consolidated basis. The figures used for the analysis are the averages for the period from fiscal 2014 to fiscal 2016. The figures for U.S. and European financial institutions were converted into yen using purchasing power parity exchange rates

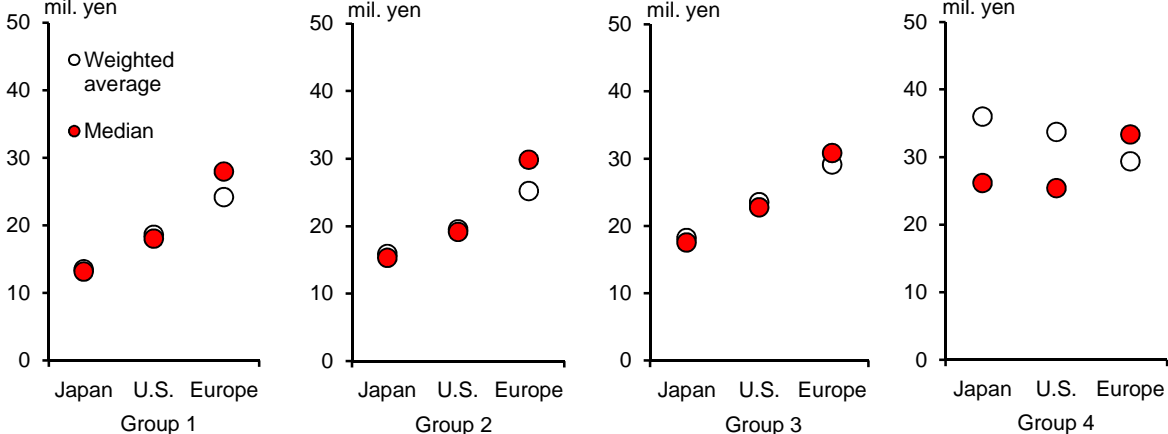
from the perspective of profits per unit of factor input, gross operating profits per branch are also low (Chart VI-2-3). **Such low profitability is due to Japanese financial institutions' low net non-interest income as well as the decline in their net interest income under the prolonged low interest rate environment (Chart VI-2-4).**

Chart VI-2-1: Number of employees per financial institution



Source: OECD; S&P Global Market Intelligence; BOJ.

Chart VI-2-2: Gross operating profits per employee



Source: OECD; S&P Global Market Intelligence; BOJ.

Since the 2000s, Japanese financial institutions have been making efforts to expand their fee and commission-based business with the aim of diversifying their profit sources, but the share of net non-interest income in gross operating profits (the net non-interest income ratio) nevertheless is

(obtained from the OECD) for the period.

Classification of financial institutions in Japan, the United States, and Europe

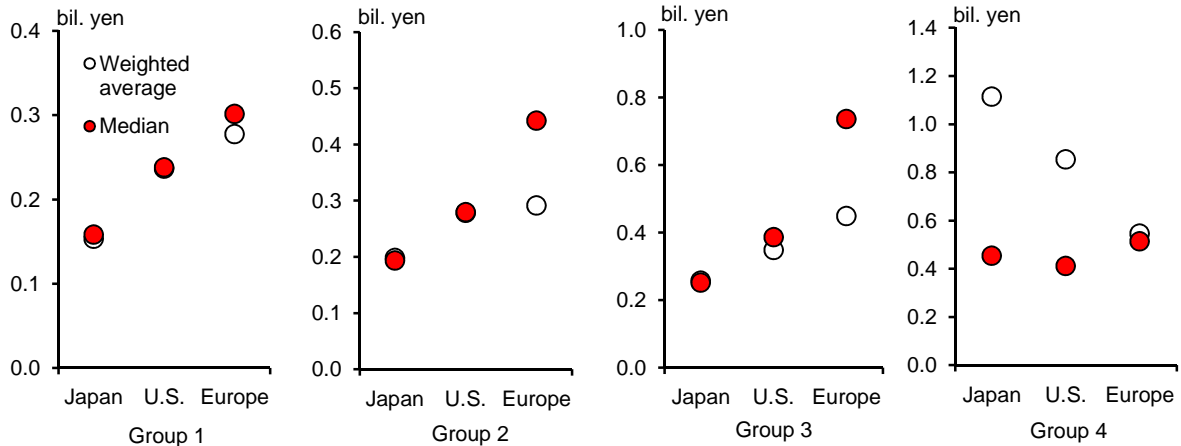
Group name	Gross operating profits	Number of financial institutions		
		Japan	U.S.	Europe
Group 1	Minimum-25th percentile (0.7-3.0 billion yen)	93	317	123
Group 2	25th-50th percentile (3.0-7.6 billion yen)	92	153	81
Group 3	50th-75th percentile (7.6-25.3 billion yen)	92	115	121
Group 4	75th percentile- (25.3 billion yen-)	93	101	166

Note: Classification is based on quartiles of gross operating profits of Japanese financial institutions. Gross operating profits include realized gains/losses on securities holdings.

Source: OECD; S&P Global Market Intelligence; BOJ.

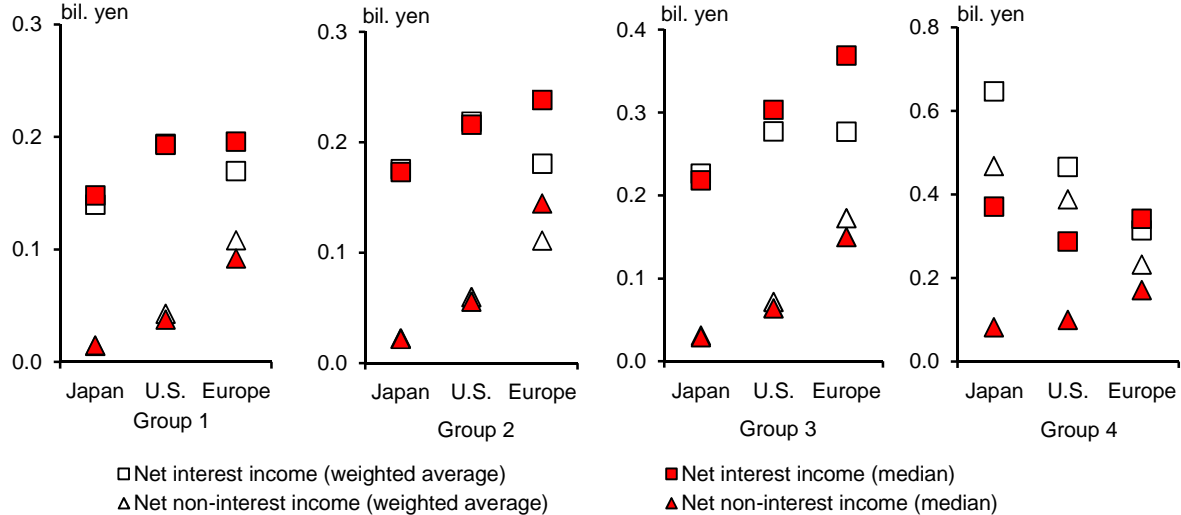
generally small from an international perspective (Chart VI-2-5). By size, whereas the net non-interest income ratio of major financial groups on average is on par with that of their U.S. and European counterparts, regional financial institutions' net non-interest income ratio is only around 10 percent, which is lower than that of U.S. and European financial institutions of the similar size.

Chart VI-2-3: Gross operating profits per branch



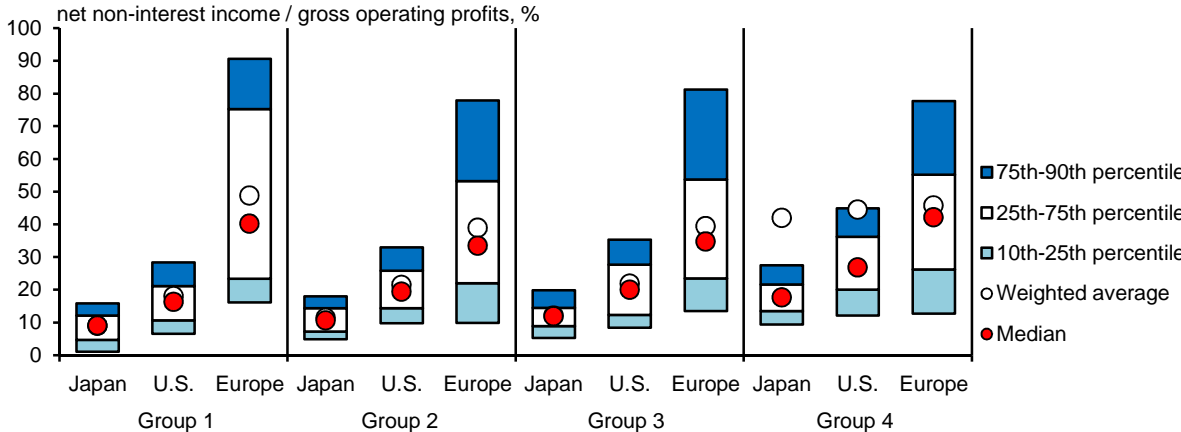
Source: OECD; Published accounts of each bank; S&P Global Market Intelligence; BOJ.

Chart VI-2-4: Net interest income and net non-interest income per branch



Source: OECD; Published accounts of each bank; S&P Global Market Intelligence; BOJ.

Chart VI-2-5: International comparison of net non-interest income ratios

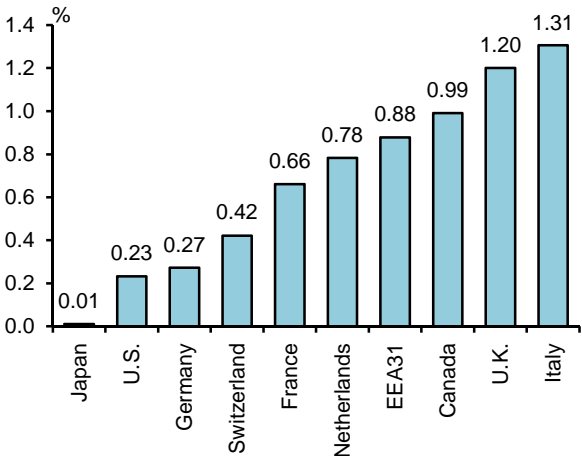


Source: OECD; S&P Global Market Intelligence; BOJ.

For U.S. and European financial institutions, net non-interest income represents an important profit source as they meticulously set and adjust fees and commissions based on the content of services and client characteristics. For example, in Europe, financial institutions secure a profit source by charging a reasonable fee for the issuance and use of debit and credit cards and providing bespoke solutions for high net worth individuals. Moreover, due to the spread of Internet banking, they also have started to impose fees for services such as paper-based balance statements. In the United States, fund management services that meet firms' outsourcing needs have been established as paid-for services. On the other hand, in Japan, there are more than a few examples where financial institutions do not impose any fees on financial services that incur a reasonable amount of costs, such as services related to account maintenance and management.

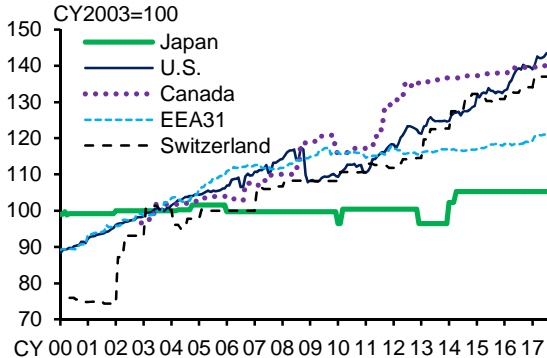
These differences in the stance regarding the setting of fees and commissions for financial services in Japan and abroad also show up clearly in the composition of household consumption expenditure. The item composition of the consumer price index (CPI) in various countries shows that the weight of financial services in Japan is much lower than in the United States and Europe (Chart VI-2-6). Furthermore, in contrast to the United States and Europe, where the prices of financial services have been rising at an annual rate of about 2 percent, in Japan, the prices of financial services have for a long time essentially remained unchanged (Chart VI-2-7). These facts mean that whereas for financial institutions in the United States and Europe, fee and commission income from households forms a stable source of profits, Japanese financial institutions lack such profit source.

Chart VI-2-6: Weights of financial services in the CPI



Note: 1. The data are on the 2015-base.
 2. EEA31 refers to the European Economic Area member countries and covers 28 EU member states, Iceland, Liechtenstein, and Norway.
 Source: Haver Analytics; Ministry of Internal Affairs and Communications.

Chart VI-2-7: Price indices for financial services in the CPI

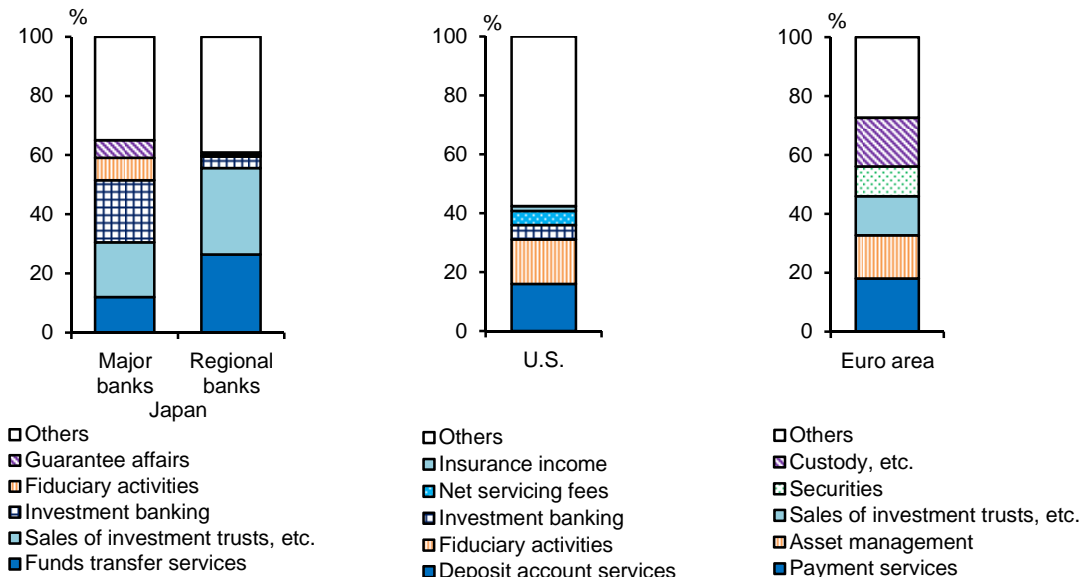


Note: 1. Latest data as at July 2017.
 2. EEA31 refers to the European Economic Area member countries and covers 28 EU member states, Iceland, Liechtenstein, and Norway.
 Source: Haver Analytics; Ministry of Internal Affairs and Communications.

Taking a closer look at net non-interest income, a breakdown of fee and commission income shows that there are also differences in terms of diversity in profit sources (Chart VI-2-8). In Europe, the commission and fee income sources are diversified partly due to the established universal banking system. In the United States as well, various fees and commissions ("others" in the chart) make up the majority. In contrast, in Japan, the major financial groups with several affiliates have relatively diversified commission and fee income sources other than commercial banking businesses. At regional financial institutions, however, the fees and commissions for funds transfer services and investment trust and insurance sales account for a majority of fee and commission income. In particular, the fees and commissions for sales of investment trusts, which

make up a large share of fee and commission income, are not a stable source of income because of their high sensitivity to market developments. Therefore, this has thus far been one factor raising the fluctuations in regional financial institutions' income.

Chart VI-2-8: Composition of fee and commission income



Note: Data as at fiscal 2015. The data for major banks of Japan cover the three major financial groups on a consolidated basis, and the data for regional banks of Japan are on a non-consolidated basis.
Source: ECB; FDIC; Published accounts of each entity; BOJ.

Looking ahead, as demand for traditional deposit-taking and lending business is expected to remain sluggish due to the population decline, it will not necessarily be easy to sustainably expand domestic net interest income. Therefore, in order to diversify their profit sources and establish a stable income structure, financial institutions need to make various efforts to utilize their core competence while differentiating the services they provide. When doing so, considering also that Japan's financial institutions have more employees than their U.S. and European counterparts, it will be important for them to make efforts to raise labor productivity by allocating staff more efficiently through operational reforms (Chart VI-2-1).

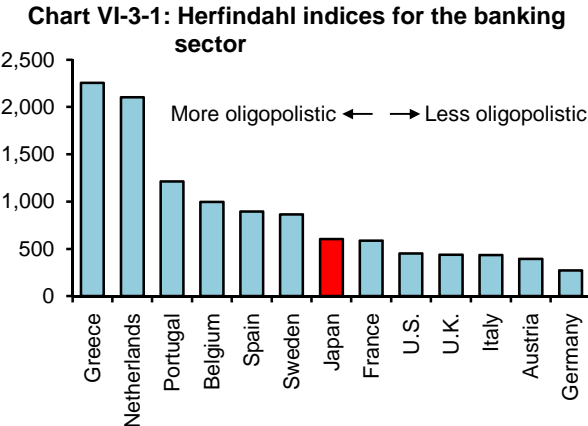
C. Competitive environment for financial institutions

As pointed out in the previous section, financial institutions in Japan have lower gross operating profits per branch than their U.S. and European peers, and the breakdown showed that not only their net interest income, which tends to fluctuate with the interest rate environment, but also their net non-interest income is low (Chart VI-2-4). These observations suggest that Japanese financial institutions' low profitability is due not only to persistent low interest rates but also to other structural factors. Specifically, one likely factor is that competition among financial institutions has continued to intensify for a long time.

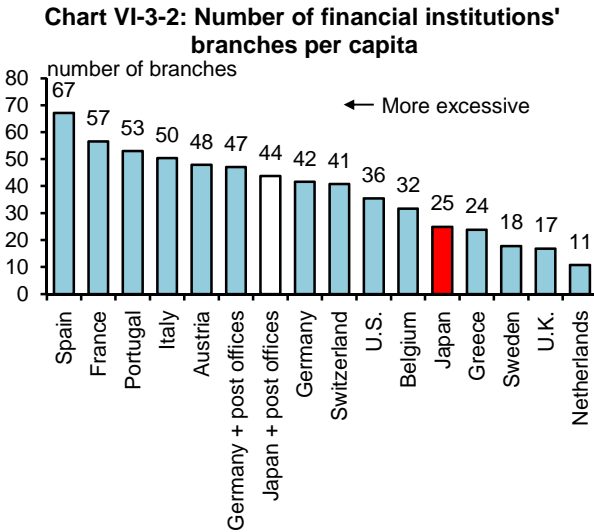
International comparison of the number of financial institutions and their branches

Calculating the Herfindahl index -- a widely used index for measuring the degree of competition in an industry -- for the banking sector in a range of advanced economies, we find that degree of oligopoly is higher for Japan than for the United States and for Germany, which is frequently cited

as a typical example of an overbanked country (Chart VI-3-1).³⁴ Thus, looking at the Herfindahl index only, competition in Japan's banking sector does not appear to be particularly severe from an international perspective.³⁵ It should be noted, however, that the Herfindahl index is based solely on supply side information regarding financial institutions (the number of financial institutions and the scale of each financial institution). The actual degree of competition is also affected by demand factors. For example, if the population and the number of firms decrease and the market size declines while the number of financial institutions remains unchanged, financial institutions will have to compete for a shrinking pie (demand) to maintain their profits. As a result, the state of competition will be intensified. In addition, competition takes place among the branches that actually provide financial services, and thus not only the number of financial institutions but also the number of branches should be taken into account in assessing the state of competition.



Note: Based on total assets. Data as at end-2015 (data for Japan as at end-fiscal 2015).
Source: ECB; FDIC; BOJ.



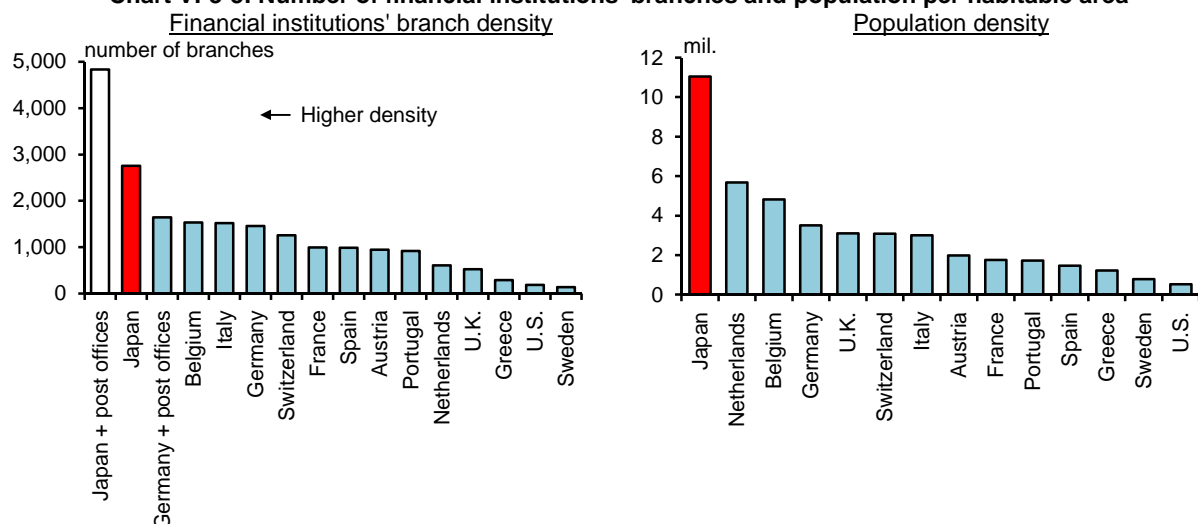
Note: The number of branches per 100,000 population. Basically, data as at end-2015 (data for Japan as at end-fiscal 2015).
Source: CUNA; ECB; Eurostat; FDIC; FSA; Ministry of Internal Affairs and Communications; Published accounts of each entity; SNB; U.S. Census Bureau; BOJ.

We therefore make an international comparison regarding the relationship between the size of the population, which determines the size of the market, and the number of financial institutions' branches (Chart VI-3-2). At first glance, the number of financial institutions' branches per capita in Japan appears relatively low; however, if the number of post office branches, which provide bank agency services, is included, the figure is about the same as that in Germany, which is regarded as being overbanked. Additionally, the number of financial institutions' branches per habitable land area is conspicuously large in Japan (Chart VI-3-3). Of course, this is also due to the high population density of Japan. But if financial institutions' branches are densely crowded in a small area, depositors and firms will have a number of branches to choose from. Thus, the state of competition among them will intensify.

³⁴ The Herfindahl index is calculated as the sum of the squares of market shares of each financial institution. The index reaches the maximum value of 10,000 in a monopoly while it approaches zero as the market becomes close to perfect competition.

³⁵ With regard to overbanking in Europe, see European Systemic Risk Board, "Is Europe Overbanked?" June 2014.

Chart VI-3-3: Number of financial institutions' branches and population per habitable area



Note: The number of branches and the population per 10,000 km² habitable area. Basically, data as at end-2015 (data for Japan as at end-fiscal 2015).
 Source: CUNA; ECB; Eurostat; FAOSTAT; FDIC; FSA; Ministry of Internal Affairs and Communications; Published accounts of each entity; SNB; U.S. Census Bureau; BOJ.

In particular, in terms of attracting deposits, financial institutions in Japan were competing intensely with each other, as well as with the postal savings system, from before World War II until recent years. Because deposit and lending margins were sufficiently large when interest rates were regulated, opening branches and collecting as much deposits as possible was rational behavior which would directly lead to profit growth for private financial institutions. For this reason, and partly due to competition from the postal savings system, it was difficult for private financial institutions to adopt a strategy of charging deposit-related fees. Even after deposit and lending margins narrowed against the backdrop of interest rate liberalization and the low interest rate environment, the fierce competition among financial institutions continued. Banks were fully aware that if only they started charging fees, it was highly likely that deposits would flow out to other banks or the post office. Under these circumstances, a business model premised on not charging deposit-related fees seems to become entrenched at financial institutions. Thus, as financial institutions have little net non-interest income and greatly depend on net interest income for profits, a decline in population and the number of firms spurs lending competition among financial institutions, pushing down net interest income in a structural manner.³⁶

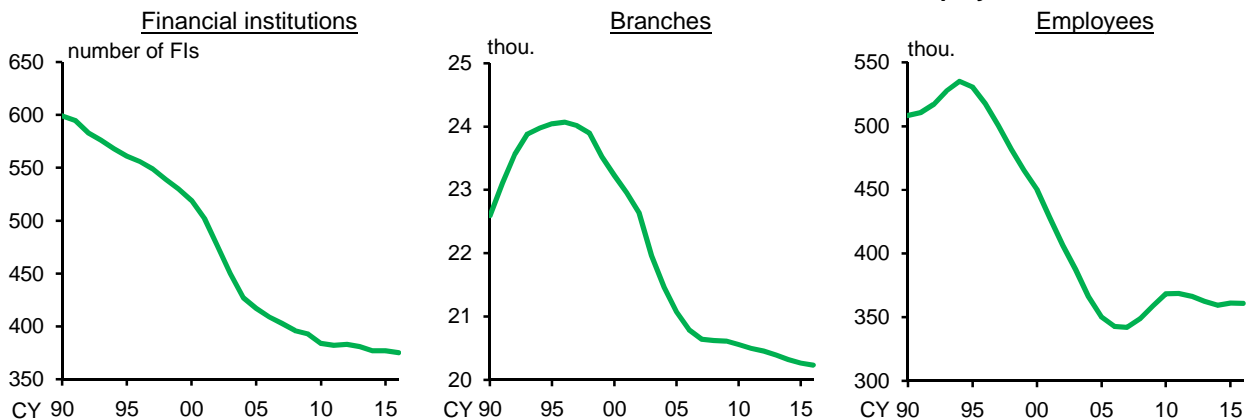
Regional distribution of financial institutions' branches

As the analysis above has shown, **the number of financial institutions' employees and the number of branches in Japan may be in excess (overcapacity) relative to demand** (Charts VI-2-1 and VI-3-2). Even though the number of branches and employees in Japan has fallen as part of the financial sector consolidation in the wake of the bursting of the bubble through the mid-2000s, **overcapacity has remained. The likely reason for this is that the population and number of firms, which determine the demand for financial transactions, have continued to decline** (Chart VI-3-4). For instance, since the early 2000s, the firm exit rate has consistently exceeded the firm entry rate, and the total number of firms seems to have decreased by about 10-20 percent over

³⁶ For empirical analyses on this issue, see Box 3 in the April 2017 issue and Box 4 in the October 2016 issue of the *Report*.

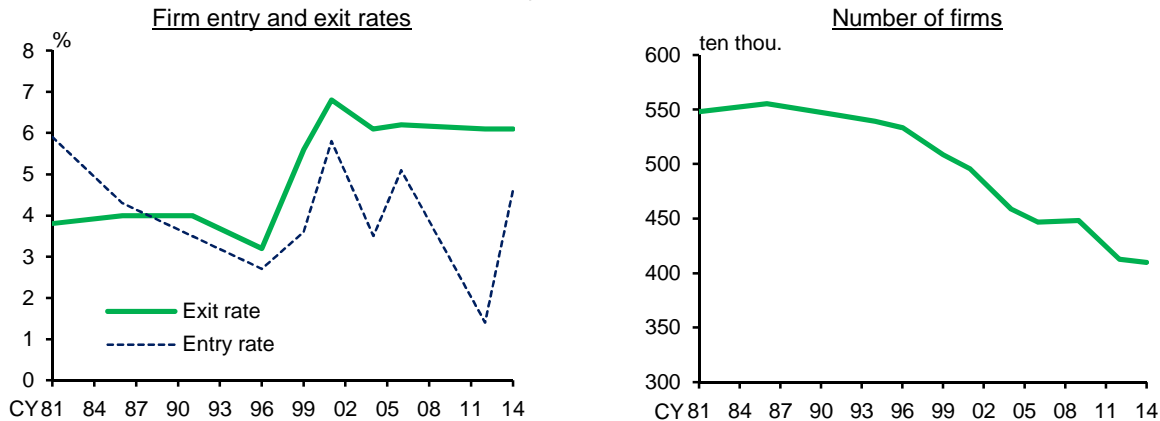
the last decade (Chart VI-3-5).³⁷ This reflects the decline in the potential and expected growth rates amid population decline and the lack of business successors on the back of population aging.

Chart VI-3-4: Number of financial institutions, branches, and employees



Note: Covers major banks (excluding trust banks), regional banks, and *shinkin* banks. Latest data as at end-March 2016.
Source: Deposit Insurance Corporation of Japan; BOJ.

Chart VI-3-5: Firm entry and exit rates, and number of firms



Note: 1. Firm entry and exit rates in the left-hand chart cover corporations and individual proprietorships but exclude the primary industry. The number of firms in the right-hand chart is that of privately owned establishments, which cover single-unit establishments and head offices (headquarters and main offices).
2. The data in both the left- and right-hand charts are calculated using the "Establishment and enterprise census" in and before 2006, the "Economic census for business frame and business activity" in and after 2009. Missing data are linearly interpolated.

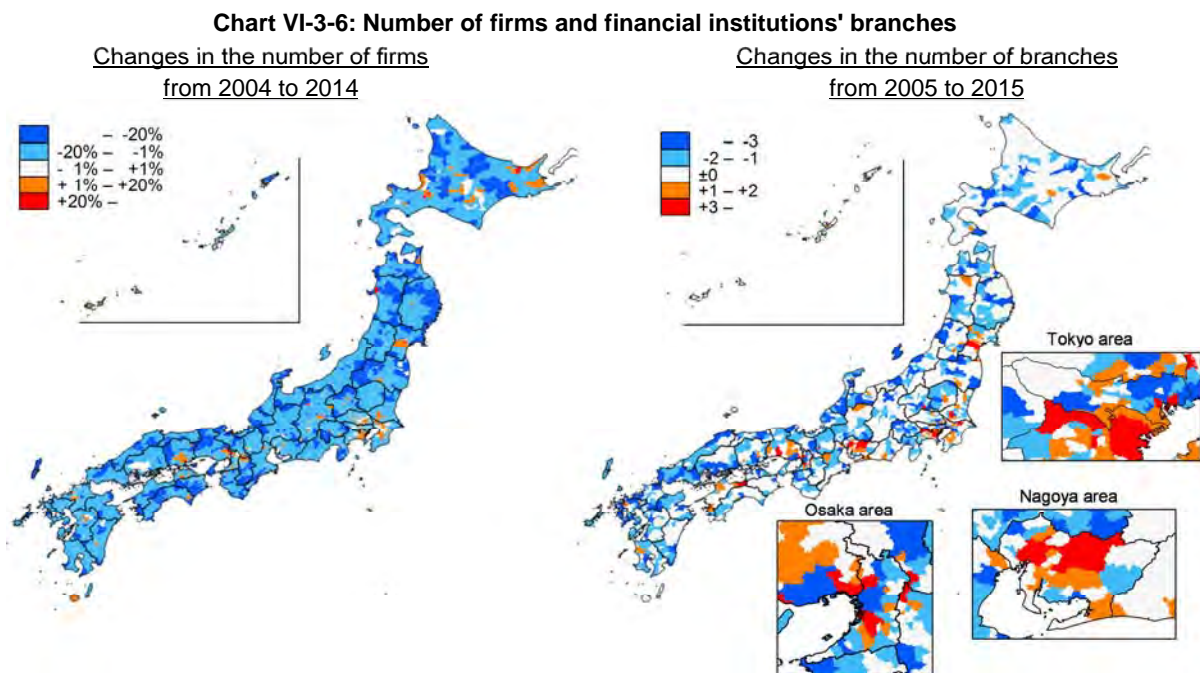
Source: Ministry of Internal Affairs and Communications; The Small and Medium Enterprise Agency.

Under these circumstances, financial institutions are closing down unprofitable branches in provincial areas, and some financial institutions are also reducing branches in metropolitan areas through consolidation and reorganization (Chart VI-3-6).³⁸ However, while the number of firms has declined in almost all regions of Japan over the past decade, there are many regions where the number of financial institutions' branches has remained unchanged, and there are even some

³⁷ As for the number of firms, the statistical data in the "Establishment and Enterprise Census" can be used in and before 2006 and the "Economic Census for Business Frame and Business Activity" can be used in and after 2009, but the survey coverage of the latter is more extensive (the latest data for each municipality are as at 2014). The rate of decline in the number of firms for the 10 years between 2004 and 2014 -- which is simply calculated by disregarding the difference in coverage between these statistics -- is slightly above 10 percent. However, given the more extensive coverage of the "Economic Census for Business Frame and Business Activity," the actual rate of decline in the number of firms seems to be higher.

³⁸ The top 3 cities that have seen the largest decrease in the number of branches over the past decade are Fukuoka (minus 31 branches), Kitakyushu (minus 29 branches), and Sapporo and Osaka (minus 23 branches each), each reflecting consolidation among financial institutions.

metropolitan areas, such as the Tokyo metropolitan area and prefectural capitals, where the number of branches has increased.³⁹



Note: In the right-hand chart, the number of financial institutions' branches in 2015 and that in 2005 are based on the 2016 edition and the 2006 edition of "Nihon kinyu meikan" (Japan's financial directory), respectively.

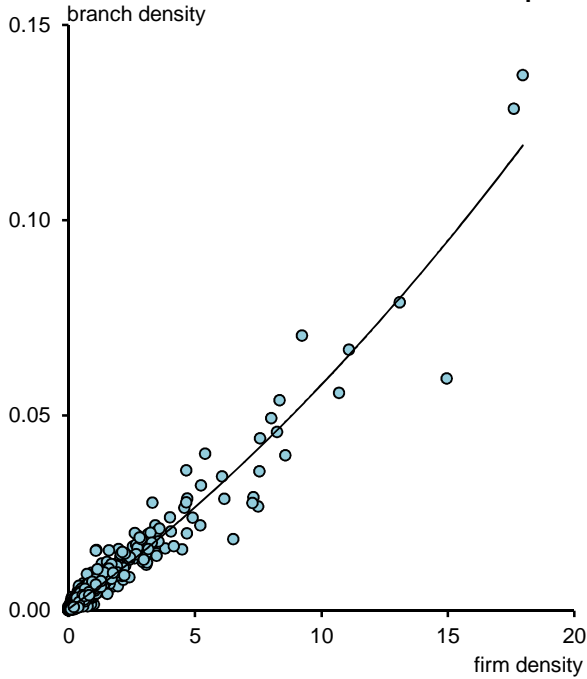
Source: The Japan Financial News Co., Ltd.; Ministry of Internal Affairs and Communications; Ministry of Land, Infrastructure, Transport and Tourism.

In service industries, including the banking industry, the geographical scope of the market is basically limited, since it is generally based on the face-to-face supply of services at a store or branch -- which differs from the manufacturing industry, where firms can expand the market by supplying goods to overseas customers. For this reason, the population density and firm density in the area where a store or branch is located greatly influence the profitability of service-related firms. If a store or branch is located in an area with low demand density, it has few transactions and it is difficult to make profits; conversely, if a store or branch is located in an area with high demand density, it is possible to make profits, in other words, the so-called "economies of density" holds. The fact that the number of financial institutions' branches in provincial areas has been decreasing and that in metropolitan areas has been increasing can also essentially be explained by the economies of density (Chart VI-3-7). In other words, financial institutions tend to concentrate their branches in metropolitan areas with a relatively high density of firms, particularly metropolitan areas where the population is increasing (Box 1).

However, looking at the link between branch density and demand density (population density and firm density) at the municipality level across Japan, there are significant variations across regions, and in fact there are areas where the number of branches is excessive relative to demand (Chart VI-3-8). Specifically, these areas can be broadly divided into (1) provincial areas in which the demand density is relatively low and the pace of decrease in the number of branches is not keeping up with the decline in population and the number of firms, and (2) metropolitan areas with a relatively high demand density, where financial institutions' branches are concentrated and/or the number of branches is increasing.

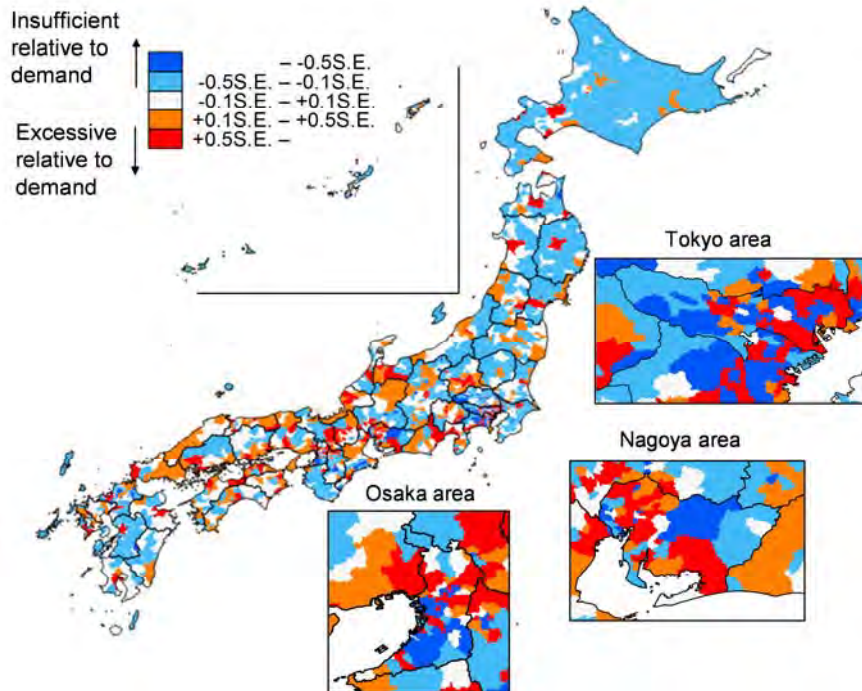
³⁹ The top 3 cities that have seen the largest increase in the number of branches over the past decade are Nagoya (plus 19 branches), and Yokohama, Amagasaki, Nishinomiya, Narita, and Tsukuba (plus 7 branches each).

Chart VI-3-7: Relationship between branch density and firm density



Note: 1. The data for the branch density as at 2015, and for the firm density as at 2014. The units of both branch and firm densities are 100 per km².
 2. The curve in the chart indicates a quadratic approximation.
 3. Government-ordinance-designated cities in Osaka, Kanagawa, and Aichi prefectures are indicated by administrative ward unit.
 Source: The Japan Financial News Co., Ltd.; Ministry of Internal Affairs and Communications.

Chart VI-3-8: Excess in the number of financial institutions' branches for each municipality



Note: 1. Data as at 2015.
 2. The excess in the number of financial institutions' branches is defined as the residuals of the cross-sectional estimation shown in Box 1, divided by their standard errors (S.E.).
 3. Government-ordinance-designated cities in Osaka, Kanagawa, and Aichi prefectures are indicated by administrative ward unit.
 Source: Ministry of Land, Infrastructure, Transport and Tourism.

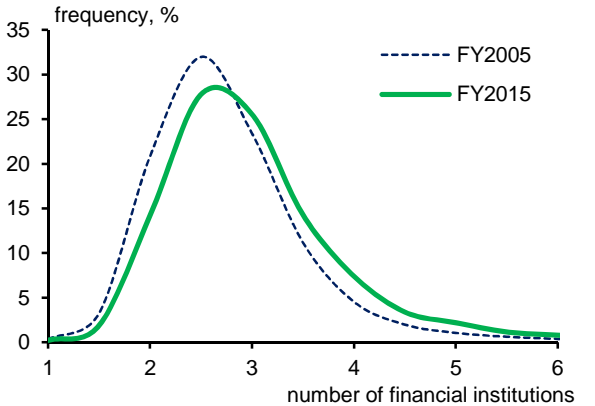
For individual financial institutions, it may be a rational strategy to determine the geographical configuration of branches based on the economies of density. However, if many financial institutions adopt the same strategy, the number of branches even in metropolitan areas can become excessive (i.e., result in overcapacity). It should be noted that this may give rise to the "fallacy of composition," where the profitability of new branches is lower than planned and/or that of

existing branches falls due to the excessive intensification of competition among financial institutions. Therefore, it is necessary for each financial institution to properly assess the profitability of branches not only in provincial areas, but also in metropolitan areas where demand density is relatively high, and consider management strategies accordingly.

Changes in relationships with firms

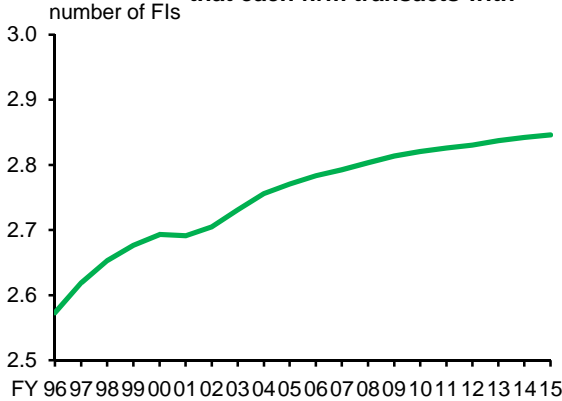
The intensified competition among financial institutions' branches amid the decrease in the number of firms has started to have a clear effect on the business relationships between financial institutions and firms. Looking at the distribution of the average number of financial institutions that each firm transacts with across branches, the number has increased over the past decade on the whole (Chart VI-3-9). Moreover, from a time-series perspective, the average number of financial institutions that each firm transacts with has increased almost consistently since 1996, from when data are available (Chart VI-3-10). **As the number of firms within bank branches' business areas is decreasing, bank branches' efforts to look for new transaction opportunities and boost their corporate business seem to have led to an increase in the number of financial institutions that each firm transacts with.** For firms, this means that they have been able to obtain more favorable loan conditions by increasing the number of financial institutions that each of them transacts with.

Chart VI-3-9: Distribution of the number of financial institutions that each firm transacts with



Note: Covers about 700,000 firms for which data for the entire observation period are available from fiscal 2005.
Source: Teikoku Databank.

Chart VI-3-10: Number of financial institutions that each firm transacts with



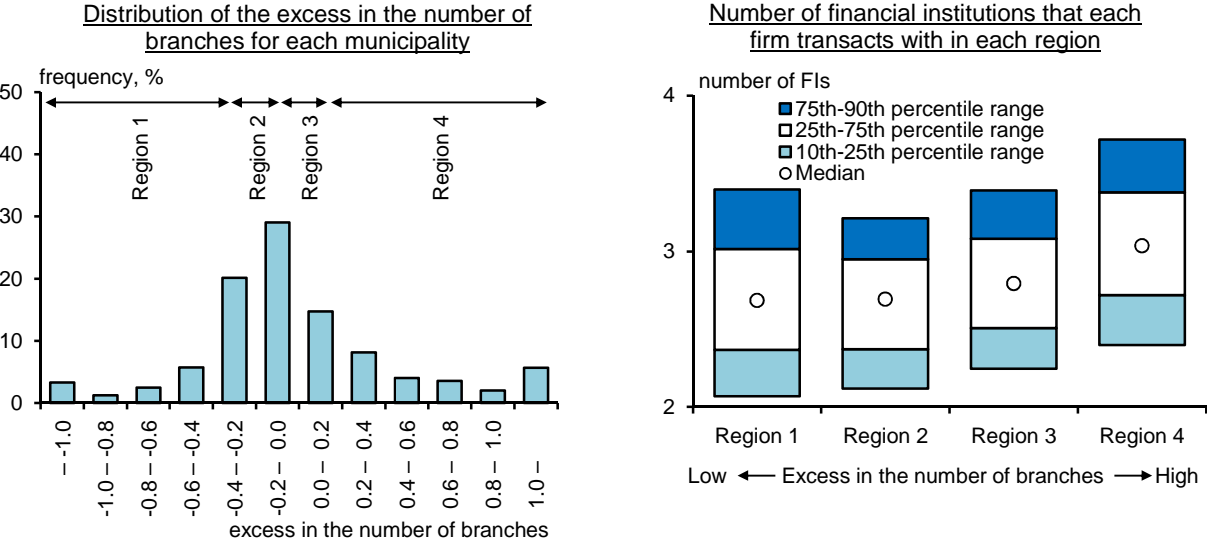
Note: Covers about 450,000 firms for which data for the entire observation period are available from fiscal 1996.
Source: Teikoku Databank.

The increase in the number of financial institutions that each firm transacts with has occurred especially in areas in which the excess in the number of branches seems to be severe (Chart VI-3-11). On average, firms transact with two to three financial institutions, but especially in metropolitan areas, where there is a heavier concentration of financial institutions' branches, a growing number of firms transact with five or more financial institutions (Chart VI-3-12).⁴⁰ However, the change in the number of financial institutions that each firm transacts with differs by size of firm. Whereas for micro and small firms, the number of financial institutions that each of them transacts with has increased, for large firms, the number has decreased (Chart VI-3-13). With regard to

⁴⁰ The reason the average number of financial institutions that each firm transacts with is high in areas with a high branch density is because the share of large and medium-sized firms is high in such areas. As of 2015, whereas the average number of financial institutions that each large and medium-sized firm transacted with was 3.5, the corresponding figures were lower at 2.9 for small firms and 2.0 for micro firms. Because there are many large and medium-sized firms in areas with a high branch density such as the Tokyo metropolitan area, the average number of financial institutions that each firm transacts with is also large in such areas.

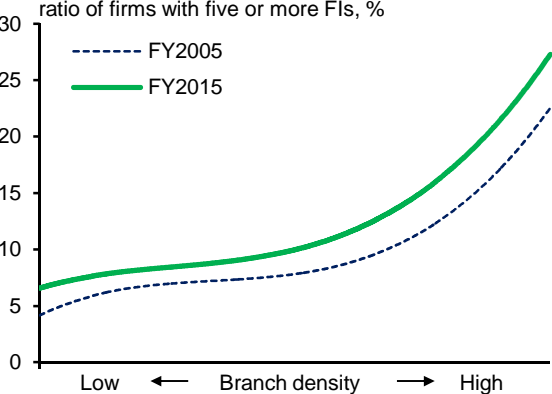
transactions with large firms, while regional banks have cultivated transactions by participating in syndicated loans, major banks are increasingly putting their focus on becoming the main bank of large firms to promote integrated transactions that include fee and commission-based business. As for transactions with small and micro firms, regional financial institutions have strengthened their relationships with local firms through middle-risk loans. And whereas regional banks have recently started to expand into transacting with micro firms, which usually have a *shinkin* bank as their main bank, *shinkin* banks have been increasing their transactions with small firms, which usually have a regional bank as their main bank, meaning that competition between the two types of financial institutions is intensifying.

Chart VI-3-11: Relationship between branch density and the number of financial institutions that each firm transacts with



Note: 1. Data as at 2015.
 2. The excess in the number of branches is defined as the residuals of the cross-sectional estimation shown in Box 1, normalized by their standard errors. Municipalities are grouped into four regions according to the excess in the number of financial institutions' branches (each region includes 25% of all municipalities).
 3. The vertical axis in the right-hand chart shows the average number of financial institutions that each firm transacts with.
 Source: The Japan Financial News Co., Ltd.; Teikoku Databank.

Chart VI-3-12: Distribution of the number of financial institutions that each firm transacts with in each municipality

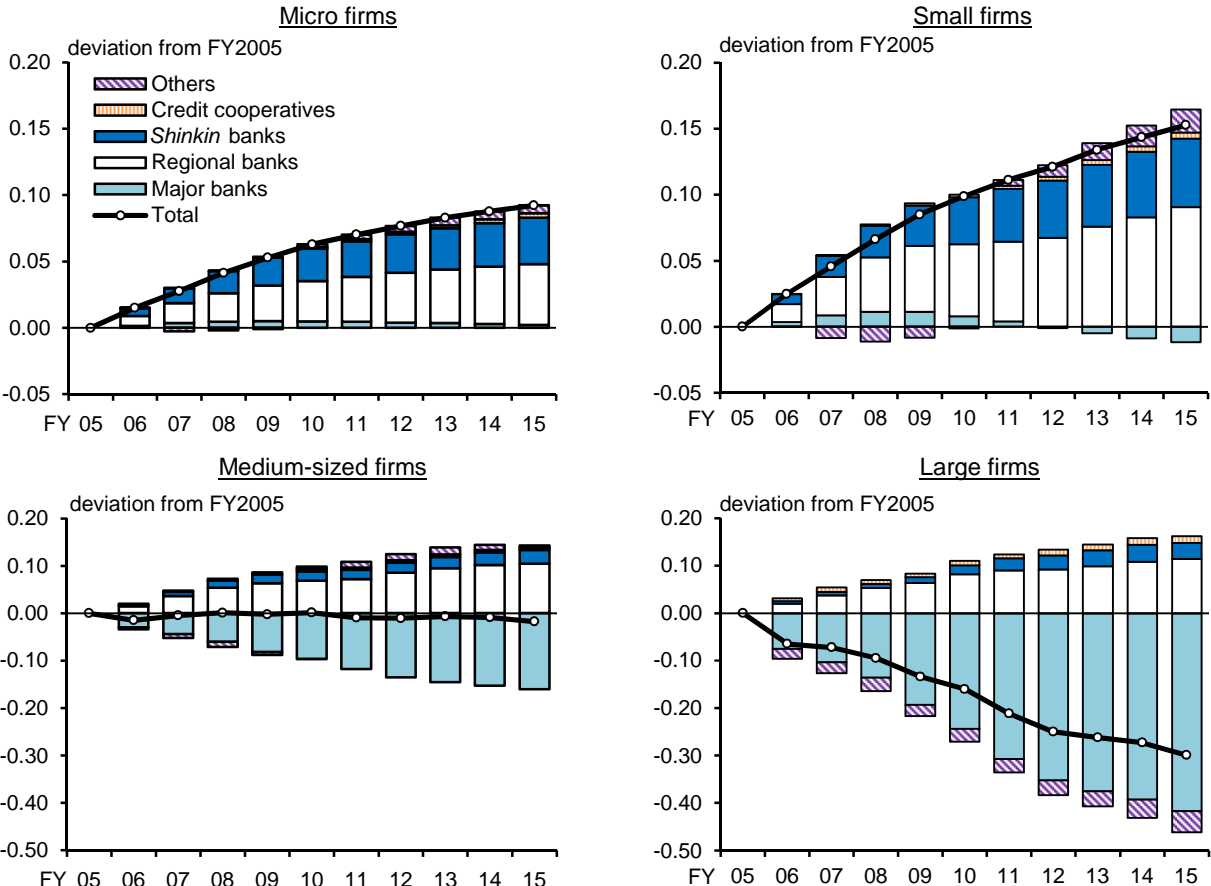


Note: Ratios of firms that transact with five or more financial institutions are plotted in order of the lowest to highest branch density in each municipality and smoothed by a polynomial.
 Source: The Japan Financial News Co., Ltd.; Teikoku Databank.

An issue that warrants attention is how the increase in the number of financial institutions that each micro and small firm transacts with, which reflects the intensified competition among banks, will affect firm-bank relationships. For example, **if it becomes common for firms to choose the financial institution offering the lowest loan interest rate among a number of financial institutions when taking out a loan, regardless of whether the financial institutions have**

any transaction history or capacity to support businesses, business relationships between firms and their main bank will weaken. This may lower the efficiency of capital allocation by discouraging financial institutions' information production activities in the medium to long run. This tendency will be more pronounced if financial institutions conduct credit transactions that are overly dependent on collateral and guarantees. Although, at present, firm-bank relationships have not weakened to this extent, how the intensification of competition among banks will affect financial intermediation going forward is an important issue.

Chart VI-3-13: Decomposition of changes in the number of financial institutions that each firm transacts with



Note: 1. Covers about 700,000 firms for which data for the entire observation period are available from fiscal 2005.
 2. Micro firms are firms with capital of less than 10 million yen; small firms from 10 million to 100 million yen; medium-sized firms from 100 million to 1 billion yen; and large firms more than 1 billion yen.

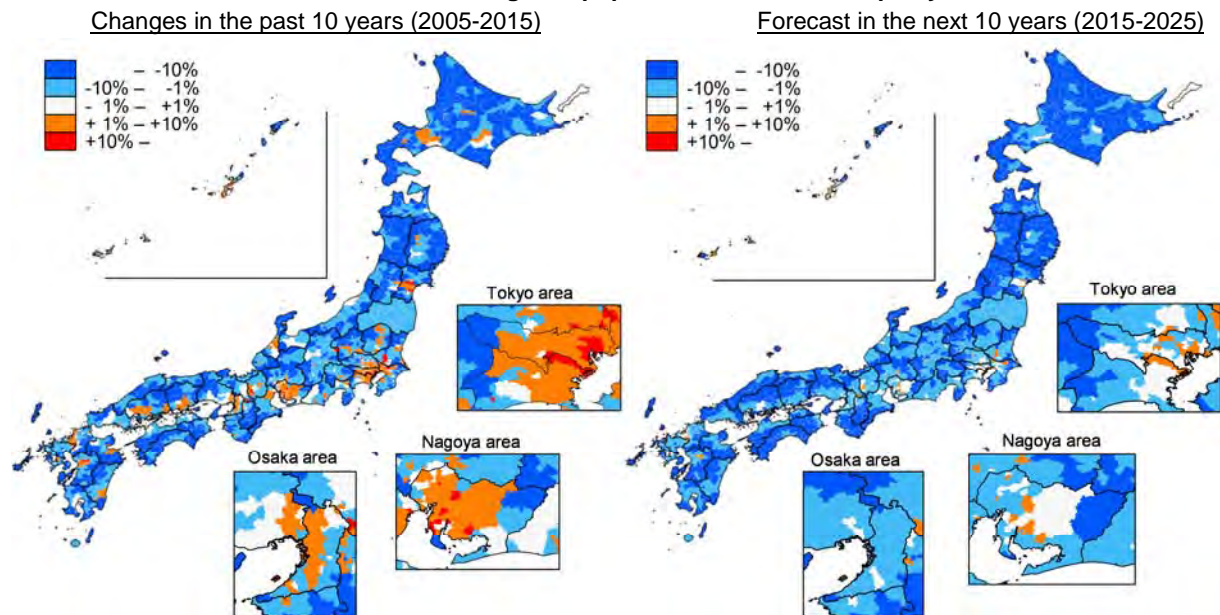
Source: Teikoku Databank.

Intensified competition among financial institutions and systemic risk

Financial institutions whose business areas are in municipalities where the number of branches is excessive relative to demand tend to face fierce competition and have lower pricing power for their financial intermediation services such as lending (Box 2). Although some financial institutions have increased the number of branches in metropolitan areas in view of population growth in the future, it is expected that in most areas of the country, the population will decline (Chart VI-3-14). Moreover, if the decline in the number of firms continues in the future -- in other words, if the firm exit rate continues to be higher than the firm entry rate -- competition among financial institutions is likely to become more intense unless there is sufficient progress in the adjustment of the number of branches. Furthermore, advances in IT and the increase in generations with greater willingness to

use digital technology may lead to a decrease in the frequency of customer visits, which may greatly reduce the significance of branches.

Chart VI-3-14: Changes in population in each municipality



Note: The data for Fukushima prefecture is the average rate of population change in the prefecture.

Source: Ministry of Internal Affairs and Communications; Ministry of Land, Infrastructure, Transport and Tourism; National Institute of Population and Social Security Research.

If competition among financial institutions continues to be excessively severe, there is a risk that financial institutions' stability will be undermined.⁴¹ Specifically, financial institutions may engage in excessive risk taking, or may reduce their loss-absorbing capacity due to a profit decline as a result of competition. In fact, over the long run, the expected default frequency (EDF) for regional banks extracted from the stock market is correlated with indicators for the state of competition (such as the markup) faced by banks (Chart VI-3-15).⁴² That is, although the short-term EDF temporarily rose sharply following the Bank of Japan's decision to introduce the negative interest rate policy (January 2016), it has recently declined again. Meanwhile, the medium- to long-term EDF has been following a moderate upward trend since even before the introduction of Quantitative and Qualitative Monetary Easing (QQE) and the negative interest rate policy, and this upward trend coincides with the declining trend of regional banks' markups. As pointed out in Box 3 in the April 2017 issue of the *Report*, not only monetary easing but also population decline and the increase in the number of competing branches have made a considerable contribution to the decline in regional banks' markups. This structural downward pressure on profitability also manifests itself as an increase in regional banks' EDF.

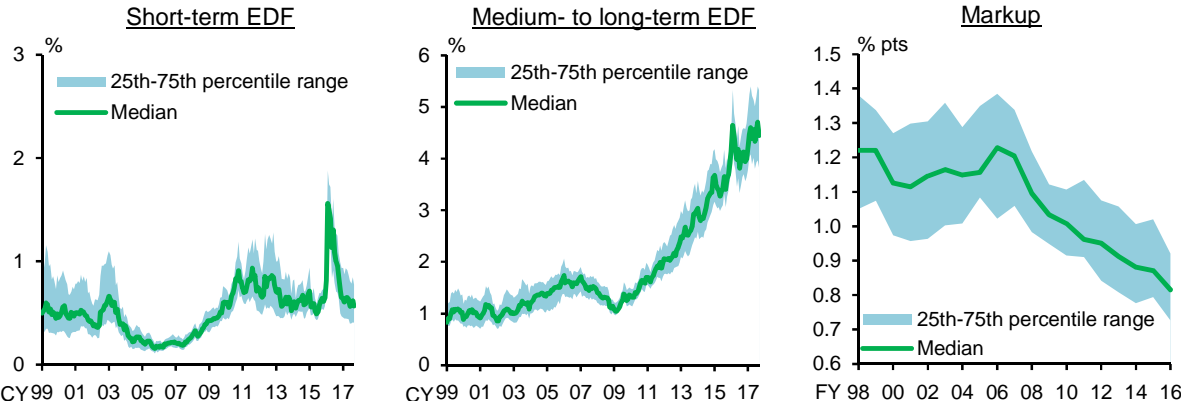
It should be noted that (1) the decline in population and the number of firms, which is a structural factor underlying the intensified competition among financial institutions, is not an idiosyncratic shock occurring in certain areas, but a common shock occurring across Japan (Charts VI-3-6 and VI-3-14); and (2) since net interest income is a major profit source for many regional financial institutions, banks are more likely to compete on loan interest rates -- that is, they have a common

⁴¹ For details, see Box 6 in the April 2017 issue of the *Report*.

⁴² Moody's EDF is defined as a measure of the probability that the market value of a firm's assets will fall below its liabilities payable over a specified period of time, which is computed based on a firm's stock price information. The EDF will rise if the market value of a firm's assets reaches close to its liabilities payable or the volatility of the market value of a firm's assets increases.

exposure to a decrease in net interest income -- than would be the case if they had various profit sources including net non-interest income. Regarding the second point, there is an effect of monetary easing to some extent; however, **because Japanese regional financial institutions' provision of non-interest services accompanying lending transactions is limited (compared to their U.S. and European counterparts), the degree of differentiation in lending transactions is low, and they tend to engage in interest rate competition. If regional financial institutions continue to face the common and chronic stresses and remain under the intensified competition without diversifying their profit sources and properly adjusting their resource input relative to demand, many financial institutions will simultaneously lose their loss-absorbing capacity in the medium to long run, and this could develop into systemic risk.** In fact, with competition among regional financial institutions intensifying, systemic risk indicators extracted from the stock market are moderately increasing (Box 3).

Chart VI-3-15: Expected default frequency and markup of regional banks



Note: 1. Covers 56 regional banks for which long-term historical data are available.
 2. The short-term EDF in the left-hand chart is 1-year EDF, and the medium- to long-term EDF in the middle chart is 5-year forward EDF. The latest data for EDF are as at end-September 2017.
 3. The data for markup in the right-hand chart are estimated by the BOJ.

Source: Moody's.

Because financial institutions, as shown in Chapters IV and V, currently have sufficient capital bases, the increase in regional banks' EDF and in the systemic risk indicators suggested by the stock market does not imply immediate threats to the stability of the financial system. However, these market signals could be interpreted as a warning about the structural problems in the financial system, such as the decline in demand density as a result of the decline in population and the number of firms and the severe competition that financial institutions face.

While competition among firms in the non-financial private sector affects overall industry-level efficiency, it needs to be borne in mind that competition among banks in the financial sector influences not only the efficiency of the financial system but also the systemic risk. **In order to ensure both the efficiency and stability of Japan's financial system in the future, it is important for financial institutions to improve their profitability under the appropriate competitive environment.** To achieve this, financial institutions first need to differentiate the financial intermediation services they offer and make efforts to utilize their core competence. When formulating their business plans, it is important for them to (1) strive to diversify their profit sources, (2) more closely manage their profitability and review the services they offer and the efficiency of their branch configuration taking into account, for example, the competitive pressure they face from other financial institutions, and (3) improve labor productivity through operational reforms and the appropriate allocation of equipment and employees. Moreover, (4) another option to improve profitability could be through mergers, consolidations, and cooperation among financial institutions. The Bank of Japan will support such efforts of financial institutions and will continue to closely

monitor, from a macroprudential perspective, the impact on the financial system of changes in the competitive environment.

VII. Concluding remarks

Japan's financial system has been maintaining stability on the whole. In order to ensure financial stability in the future, it is essential for financial institutions to work to maintain and improve profitability while steadily responding to the accumulation of risks as well as their greater variation and complexity. Three challenges to be tackled are outlined below.

First, individual financial institutions need to develop and implement business strategies that utilize their core competence by formulating business plans toward raising their profitability, while taking into account the medium- and long-term outlook for the regional economies and their own business bases.

The profitability of domestic deposit-taking and lending activities has been on a declining trend, against the backdrop of factors such as the declining growth potential of the domestic economy and the continuation of the low interest rate environment. Going forward, the problem of financial institutions' low profitability is expected to be exacerbated, given the structural changes to the business environment, such as the shrinking regional population and business base. Individual regional financial institutions need to make efforts to strengthen their profitability by utilizing their core competence. In particular, they need to differentiate the financial intermediation services they offer from those offered by others through the following approaches: the diversification of their profit sources; the strengthening of their support for the regional economies and local firms by enhancing financial intermediation capabilities; and the utilization of IT in financial businesses, including FinTech. In addition, it is important for financial institutions to make efficient use of human resources and equipment through operational reforms and to strengthen their sales capacity as well as improve their management efficiency.

Second, financial institutions need to strengthen their ability to respond to risks in areas where they are actively stepping up their risk taking.

As core profitability has declined, financial institutions have increased their real estate loans and overseas loans with regard to lending while increasing investment trusts and foreign bonds with regard to securities investment. Currently, the risks that financial institutions are undertaking remain appropriately controlled relative to their financial bases. When looking at individual financial institutions, however, some indicate room for improvement in their risk and profit management frameworks. Making arrangements to meticulously conduct appropriate risk and profit management is essential for sustainable improvement in profitability through risk taking. In addition, cyber security protection amid the proliferation of IT utilization in financial businesses is another important challenge.⁴³

Third, large financial institutions need to respond to their increasing systemic importance.

Large financial institutions, as members of integrated group companies, have been providing a wide range of financial services, including active international business expansion such as overseas M&A activities. Therefore, these institutions have grown in size and the sources of risk and return have become more diversified and complex, thereby increasing their influence on macro financial stability and economic activity. Under these circumstances, further action by large financial institutions is more strongly called for. This includes efforts to establish a solid financial base sufficiently resilient to the accumulation of risks, to strengthen business management

⁴³ For details, see "Financial Institutions' Efforts and Challenges in Improvement regarding Cyber Security: Results of the Questionnaire Survey (April 2017)," *Financial System Report Annex Series*, October 2017 (available in Japanese only).

frameworks including the utilization of stress testing, to make preparations to respond in an orderly manner in times of stress, and to develop management information systems to deal with increasingly complex risks.

Toward ensuring the stability of the financial system, the Bank of Japan will continue to provide support to financial institutions in their efforts to meet their challenges mentioned above, through its off-site monitoring and on-site examinations.⁴⁴

⁴⁴ For more details on the basic approach in the conduct of on-site examinations in fiscal 2017, see "On-Site Examination Policy for Fiscal 2017," March 2017, and for more details on actions by the Bank of Japan for fiscal 2017, see Chapter VI in the April 2017 issue of the *Report*.

Box 1: Financial institutions' branch density and demand density

This box quantitatively examines the relationship between financial institutions' branch density and demand density. Branch density is defined as the number of financial institutions' branches per land area for each municipality. Moreover, the number of firms and the population are used as indicators of the demand for financial intermediation services in each municipality. Specifically, demand intensity for each municipality is defined as the firm density (number of firms per land area) and the population density (population per land area).

The analysis focuses on a cross-section of municipalities throughout Japan (1,797 observations in 2015).⁴⁵ Branch density, the dependent variable for the estimation, is calculated based on the number of branches (head offices, branch offices, and sub-branch offices) of banks, *shinkin* banks, and credit cooperatives. Moreover, as explanatory variables, in addition to the variables representing demand density -- i.e., firm density and population density -- the average size of firms in each municipality (the amount of sales per firm) is included as a control variable. The rationale for including firm size is that the number of financial institutions' branches is likely to be determined not only by the number of firms but also by their size.

Looking at the estimation results, all explanatory variables are statistically significant and have the expected signs (Chart B1-1). That is, financial institutions tend to locate branches in areas with a high demand density. The significant coefficient on the square of firm density indicates that branch concentration tends to rise in a nonlinear manner in places where the firm density is extremely high, such as the Tokyo metropolitan area. When the rate of population change is included as an explanatory variable in addition to the level of population density, the former variable turns out to be statistically significant. In other words, branches tend to be concentrated in areas where the population is still increasing, such as the Tokyo metropolitan area, as there seems to be strong potential demand for financial transactions.

Chart B1-1: Cross-sectional estimates: branch density and demand density

		Dependent variable: branch density [number of branches per 10 km ²]	
Explanatory variables	Firm density [100 per km ²]	2.49 *** (0.72)	2.46 *** (0.72)
	Square of firm density	0.20 *** (0.07)	0.20 *** (0.07)
	Population density [100 per km ²]	0.04 *** (0.01)	0.04 *** (0.01)
	Population change rate [%]		0.01 ** (0.01)
	Average size of firms [100 million yen per firm]	0.10 ** (0.05)	0.10 * (0.05)
Adj. R ²		0.94	0.94
S.E.		1.65	1.64

Note: ***, **, and * indicate statistical significance at the 1 percent, 5 percent, and 10 percent levels, respectively. Standard errors are given in parentheses.

⁴⁵ For government-ordinance-designated cities in Osaka, Kanagawa, and Aichi prefectures, we use the data for each administrative ward in the estimation.

Meanwhile, there is considerable variation across municipalities in the residuals of the cross-sectional estimation (Chart VI-3-8). In areas where the residual is positive, the branch density is higher relative to the demand density, while in areas where the residual is negative, the branch density is lower relative to the demand density.

Box 2: Relationship between financial institutions' branch location and markups

In order to examine how financial institutions' branch density in each municipality affects their market power (i.e., their pricing power for financial intermediation services such as lending), we conduct a cross-sectional analysis focusing on regional financial institutions.

According to microeconomic theory, the market power of a firm is determined by the price elasticity of demand for the goods and services the firm provides. If the price elasticity of demand is low -- in other words, demand does not decrease much when a firm raises its prices -- the firm has strong market power. On the other hand, if the price elasticity of demand is very high as in a situation close to perfect competition -- meaning that if a firm raises its prices, demand for its goods and services will decrease significantly as customers immediately shift to other firms -- the firm has no market power.

Financial institutions' branch density likely affects the price elasticity of demand for financial intermediation services. For example, when customers have many branches nearby, they are likely to go to another branch if one of the branches raises the prices of its financial services (such as increasing its loan interest rates or decreasing its deposit rates) -- that is, the price elasticity of demand is high. On the other hand, when there are few branches in the vicinity of customers, then even if one of the branches raises the prices of its financial services, it is unlikely that customers will go to another branch that is far away -- in other words, the price elasticity of demand is low.

The market power of a firm, which is determined by the price elasticity of demand, generally can be observed as the markup ($P-MC$) a firm can charge, that is, the difference between the marginal cost (MC) and the price (P) of the product. Specifically, we use the ratio of operating income to total assets to represent the price (P) of financial intermediation services provided by banks, while marginal costs (MC) are calculated based on panel estimates of individual banks' cost function.⁴⁶ Banks with large market power and a strong competitive advantage can charge large markups, while banks that have little market power and are exposed to severe competition can only charge small markups.

In order to examine the effect of the number of financial institutions' branches on their market power, we conduct a cross-sectional estimation for 2015 using each financial institution's markup as the dependent variable and the degree of excess in each financial institution's branch network as the explanatory variable. This "branch network excess" variable is constructed by (1) measuring the excess in branch density relative to demand density for each municipality, and (2) then calculating the average of this value for each financial institution based on the municipalities in which it operates (Chart VI-3-8).⁴⁷ In addition to the branch network excess variable, we include the ratio of loans to deposits, the nonperforming loan (NPL) ratio, and the capital adequacy ratio as the explanatory variables representing bank characteristics. Generally speaking, we would expect financial institutions with a lower ratio of loans to deposits to aim to increase loans more, which have a higher profit margin than securities, thus intensifying competition by lowering loan interest rates and leading to lower markups. Moreover, it is likely that financial institutions that have higher NPL ratios and transact with firms with lower creditworthiness will charge a higher markup.⁴⁸

⁴⁶ As for the cost function, a translog function with three factors of production (labor, fixed capital, and funds) is estimated with panel data. For details of the markup estimation, see Box 3 in the April 2017 issue of the *Report*.

⁴⁷ For regional banks that operate across a number of prefectures, we take the simple prefecture average of the excess in municipalities in which a bank operates and calculate the weighted average using the share of loans in each prefecture. For *shinkin* banks, the simple average across municipalities in which they operate is calculated.

⁴⁸ The NPL ratio is included to adjust for the effects of credit costs which are not included in the estimated marginal

Financial institutions with a higher capital adequacy ratio have the capacity to lend to firms with lower creditworthiness and thus will be able to charge a higher markup.

Looking at the estimation results, the parameter estimates for the branch network excess variable are negative and statistically significant (Chart B2-1). This indicates that, in the case of both regional banks and *shinkin* banks, financial institutions with a higher degree of excess in branches relative to demand for their business area tend to charge lower markups under more severe competition. The parameter estimates for other explanatory variables have the expected signs.

Chart B2-1: Cross-sectional estimates: effects of branch density on financial institutions' markups

		Dependent variable: markups			
		Regional banks		<i>Shinkin</i> banks	
Explanatory variables	Branch network excess	-0.05 *** (0.02)		-0.06 ** (0.03)	
	Number of FIs that each firm transacts with		-0.11 *** (0.04)		-0.06 * (0.03)
	Loan-to-deposit ratio	0.01 ** (0.00)	0.01 *** (0.00)	0.01 *** (0.00)	0.01 *** (0.00)
	Nonperforming loan ratio	0.00 (0.03)	0.02 (0.03)	0.02 *** (0.00)	0.01 *** (0.00)
	Capital adequacy ratio	0.01 (0.01)	0.00 (0.01)	0.01 *** (0.00)	0.00 *** (0.00)
Adj. R ²		0.07	0.07	0.20	0.20
S.E.		0.20	0.21	0.17	0.17

Note: 1. The estimation sample covers 104 regional banks and 252 *shinkin* banks as at fiscal 2015.
2. ***, **, and * indicate statistical significance at the 1 percent, 5 percent, and 10 percent levels, respectively. Standard errors are given in parentheses.

It is likely that, apart from branch density, the number of financial institutions that each firm transacts with also has an effect on the price elasticity of demand. When each firm transacts with many financial institutions, if a bank raises its loan interest rates above those offered by other banks, a firm will refrain from borrowing from the bank offering higher loan rates and change to another bank -- that is, the price elasticity of demand is higher. On the other hand, when a firm transacts with only one financial institution, then even if the bank increases its loan interest rates, this firm will continue transactions and will not decrease borrowing that much -- that is, the price elasticity of demand is low.

To examine this matter, we also estimate the cross-sectional model using the average number of financial institutions that each of their customer firms transacts with instead of branch network excess as the key explanatory variable.⁴⁹ The estimation results indicate that the markup tends to decrease with an increase in the number of financial institutions that each of their customer firms transacts with. Thus, in the case of regional banks, one of the reasons for their low markups is that they actively strive to gain business from large and medium-sized firms providing only thin profit margins (Chart VI-3-13).

costs.

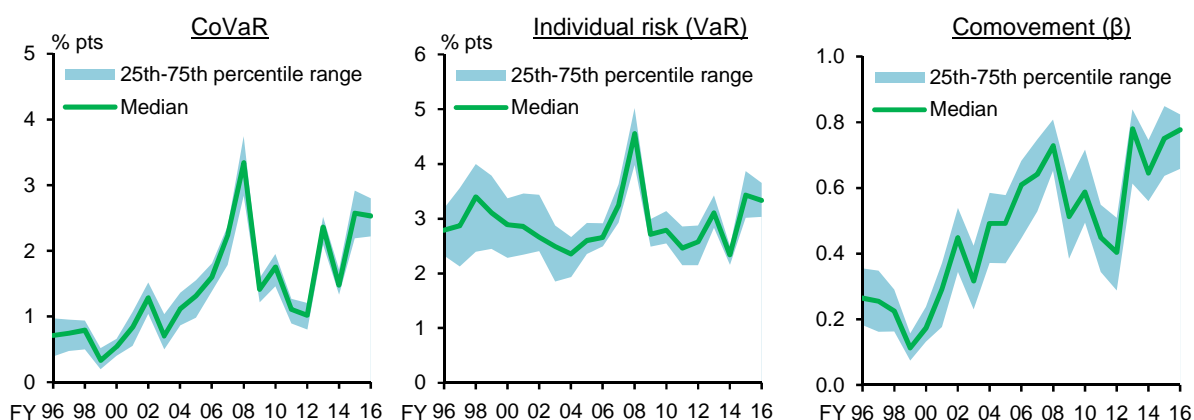
⁴⁹ Large and medium-sized firms tend to transact with a larger number of financial institutions than micro and small firms (on average). Therefore, the average number of financial institutions that each of their customer firms transacts with tends to be higher for financial institutions that do business with a lot of large and medium-sized firms. In order to adjust for this impact of customer firms' size on the estimation, we regressed the number of financial institutions that each firm transacts with on an indicator of financial institutions' customer firm size (the share of the number of large and medium-sized firms in the total number of firms) and estimated a similar cross-sectional model using the residual as a key explanatory variable. However, the estimation results remained essentially unchanged.

Box 3: Intensified competition among regional banks and systemic risk

In order to quantitatively examine the impact of competition among regional banks on systemic risk, we first measure the CoVaR. The CoVaR is widely used as a systemic risk indicator. Specifically, using stock market data, it measures the size of stress in the financial system, which comprises the following two factors: the stress faced by individual banks, and the comovement between the stresses faced by individual banks.⁵⁰ For the analysis, we use data for 56 regional banks for which data on the stock market capitalization are available for a sufficiently long period.

The measured CoVaR shows an upward trend since the mid-2000s, albeit with some fluctuations (Chart B3-1). In order to explore the reason for this trend, we decompose the CoVaR into the following two factors: (1) individual banks' risk (VaR), and (2) the comovements between the risk of individual banks and that of regional banks overall (β). While we do not observe any significant change in the size of individual banks' risk (VaR), we find that the comovement (β) has been increasing on the whole.

Chart B3-1: CoVaR among regional banks



- Note: 1. The estimation sample spans from April 1996 to March 2017 and covers 56 regional banks. The estimated values are based on rolling samples of the last 1 year.
 2. VaR in the middle chart is the difference between VaRs with the 95 and 50 percent confidence levels over a 1-year holding period.
 3. β in the right-hand chart is estimated using a quantile regression where the change in market capitalization for the regional bank sector is regressed on that for individual regional banks. The TOPIX return is used as a control variable.

To investigate the reasons for this increase in systemic risk, we examine how bank behavior under the intensified competition has affected systemic risk. To this end, we conduct a panel estimation regressing the CoVaR (as well as the VaR and β) on regional banks' markups ($P-MC$). As explanatory variables, in addition to regional banks' markups, we include banks' total assets and loan ratio to represent bank characteristics. Generally, the larger a bank's assets, the more likely the bank is to give rise to systemic risk. Moreover, the smaller a bank's loan ratio (relative to total assets) -- that is, the larger the share of securities investment in total assets --, the more likely the bank is to contribute to systemic risk. The reason is that while an increase in loans, which are relatively more idiosyncratic, will reduce common exposure among banks, an increase in holdings of securities such as government bonds will raise common exposure across banks through higher market risk.

⁵⁰ For details, see Tobias Adrian and Markus K. Brunnermeier, "CoVaR," *American Economic Review*, Vol. 106, No. 7, July 2016.

Looking at the estimation results, when CoVaR and the comovement parameter β are used as the dependent variables, all explanatory variables are statistically significant and have the expected signs (Chart B3-2). That is, the results suggest that the larger a bank, and/or the lower its loan ratio (the higher its securities holding ratio), the more likely it is to affect systemic risk. Furthermore, even when controlling for size and the loan ratio, a decline in markups exerts upward pressure on systemic risk. Meanwhile, when we use the VaR representing individual banks' risk as the dependent variable, we find that bank size has a statistically significant effect, but changes in markups do not. This reconfirms that an increase in common exposure among banks (i.e., an increase in comovement parameter β) is an important channel through which competition among banks raises systemic risk.

Chart B3-2: Panel estimates: impact on systemic risk

		Dependent variables: systemic risk indicators		
		CoVaR	Individual risk (VaR)	Comovement (β)
Explanatory variables	Markup	-0.394 *** (0.093)	0.165 (0.123)	-0.130 *** (0.033)
	Total assets [logarithmic value]	0.508 *** (0.041)	0.213 *** (0.070)	0.159 *** (0.015)
	Loan-to-asset ratio	-0.028 *** (0.004)	-0.003 (0.006)	-0.010 *** (0.002)
Adj. R ²		0.298	0.102	0.201
S.E.		0.694	0.799	0.244

Note: 1. The estimation is based on 56 regional banks for which long-term historical data on CoVaR are available. The estimation period is from fiscal 1997 to fiscal 2016. The output gap is used as an explanatory variable to control for macroeconomic factors, in addition to the three variables shown in the table. The estimates of the output gap and constant term are not reported here. To avoid an endogeneity problem, all explanatory variables are lagged by 1 year.
 2. *** indicates statistical significance at the 1 percent level. Standard errors are given in parentheses.

In fact, from a theoretical perspective, whether competition among banks increases systemic risk is not necessarily clear. The reason is that there may also be cases in which competition lowers common exposure. For example, previous studies on major banks in Europe indicate that competition among banks (a decline in markups) exerts downward pressure on systemic risk.⁵¹ It seems that when major European banks, which provide a wide range of financial services, face intensified competition, they tend to reduce common exposure with other banks by choosing and concentrating on their core competence. In contrast, for regional banks in Japan, non-interest income makes up only a small share of their income and they are highly reliant on net interest income; therefore, when competition intensifies, regional banks tend to raise common exposure by entering the business field of other banks and increasing lending there, or by increasing market investments that are similar to those of other banks.

⁵¹ See Aurélien Leroy and Yannick Lucotte, "Is There a Competition-stability Trade-off in European Banking?" *Journal of International Financial Markets, Institutions & Money*, Vol. 46, pp. 199-215, 2017.

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)

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

Net interest income = interest income – interest expenses

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

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

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

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

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

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

Credit cost ratio = credit costs / total loans outstanding

Capital adequacy ratios of internationally active banks

Common equity Tier 1 (CET1) capital ratio = CET1 capital / risky assets

CET1 capital includes common equities and retained earnings.

Risky assets are financial institutions' risk-weighted assets.

Tier 1 capital ratio = Tier 1 capital / risky assets

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

Total capital adequacy ratio = Total capital / risky 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 / risky assets

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

Risky assets are financial institutions' risk-weighted assets.