



BOJ *Reports & Research Papers*

November 2024

Broad
Perspective
Revue *Broad-Perspective Review Series*

Developments in the Japanese Money Markets and their Functioning with Excess Reserves - Including Developments after the Termination of the Negative Interest Rate Policy -

Financial Markets Department
Bank of Japan

Please contact below in advance to request permission when reproducing or copying the content of this paper for commercial purposes.

Financial Markets Department, Bank of Japan

Tel: +81-3-3279-1111

Please credit the source when reproducing or copying the content of this paper.

**Developments in the Japanese Money Markets
and their Functioning with Excess Reserves
- Including Developments after the Termination of
the Negative Interest Rate Policy -**

Abstract

While implementing a variety of unconventional monetary policy measures, the Bank of Japan has provided ample reserves that far exceed the levels of required reserves for most of the past 25 years. This report assesses the impact of the unconventional monetary policy measures on the money markets by looking back on the rate formation and transaction trends in the money markets with such excess reserves.

The money markets are expected to function as (1) the starting point of the yield curve and (2) a place to adjust the excess and shortage of funds. With excess reserves, the importance of the latter function is considered to be declining. However, there is a growing importance of ensuring the uncollateralized call market consisting of diverse participants with a certain transaction volume, given the role which the uncollateralized overnight call rate (TONA) has taken as an interest rate benchmark in recent years.

The period in which unconventional monetary policy measures were taken can be broadly divided into (1) the quantitative easing period from 2001 to 2006 (the first phase), (2) the period from the introduction of the complementary deposit facility in 2008 to the introduction of the negative interest rate policy in 2016 (the second phase), and (3) the negative interest rate policy period from 2016 to 2024 (the third phase), based on the interest rate on excess reserves. In the first phase, in which the complementary deposit facility did not exist and a zero percent interest rate was applied to excess reserves, trading incentives were lost in the uncollateralized call market, and the functioning of the market declined. In the second phase, the complementary deposit facility was introduced, and trading incentives arose between financial institutions eligible for the facility and those not eligible. Under these circumstances, the functioning of the uncollateralized call market gradually recovered and was maintained in the third phase as well. Meanwhile,

The authors of this paper are Masuhiro Awai (currently, at the Secretariat of the Policy Board, masuhiro.awai@boj.or.jp), Joji Ide (jouji.ide@boj.or.jp), and Masato Takahashi (masato.takahashi@boj.or.jp). The authors received help from Maho Uchida, Yasuhiro Kubokura, Takashi Suemasa, and Kaito Matsumura in preparing the figures.

the functioning of the GC repo market was also maintained in terms of rate formation and transaction trends.

Following the decision to change the monetary policy framework in March 2024 and the termination of the negative interest rate policy, the money markets transitioned smoothly from the world of "negative interest rates" to the one with "positive interest rates." The fact that participants in the uncollateralized call market were diversified, resulting in the expansion of trading networks in the third phase, among other factors, has contributed to the smooth transition.

Given the role which TONA has taken as an interest rate benchmark in recent years, in addition to the fact that the Bank set the short-term interest rate as its primary policy tool, it is becoming ever more important that the functioning of the money markets remains robust. The Bank intends to continue to carefully monitor the rate formation and trading trends in the money markets and pay attention to the market functioning.

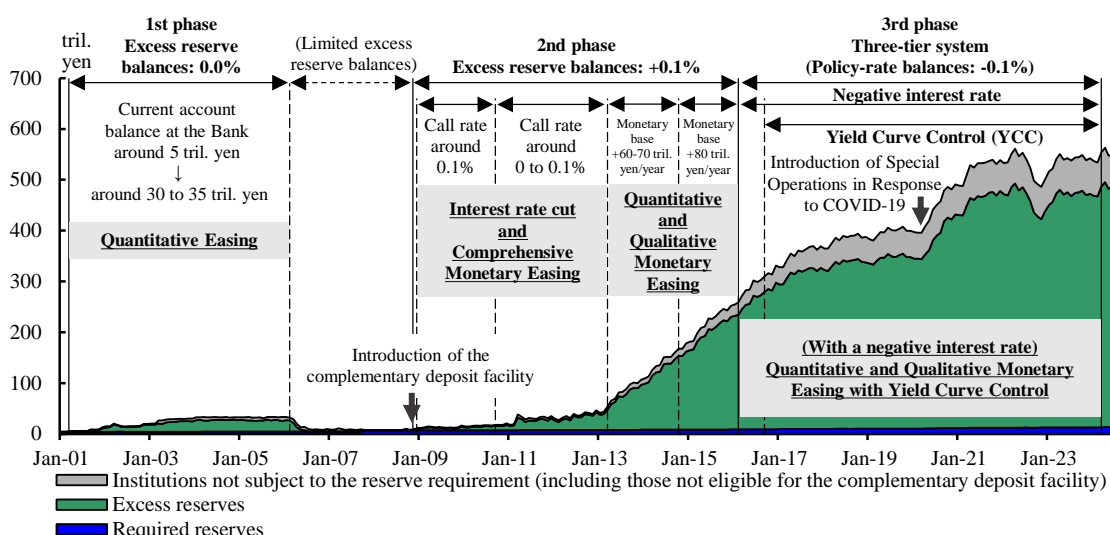
Table of Contents

1. Introduction	4
2. Expected Functions of the Money Markets.....	5
(1) Function as the starting point of the yield curve	
(2) Function as a place to adjust the excess and shortage of funds	
3. Uncollateralized Call Market with Excess Reserves: Rate Formation and Trading Trends.....	6
(1) First phase: quantitative easing period from 2001 to 2006	
(2) Second phase: period from the introduction of the complementary deposit facility in 2008 to the introduction of the negative interest rate policy in 2016	
(3) Third phase: period from the introduction of the negative interest rate policy in 2016 to the changes in the monetary policy framework in 2024	
4. Other Notable Developments in the Money Markets with Excess Reserves	17
(1) Contraction of the collateralized call market	
(2) Expansion of the repo market and factors affecting the GC repo rate	
(3) Investment demand for T-Bills with negative yields	
5. Developments in the Money Markets after the Termination of the Negative Interest Rate Policy	22
(1) Developments in the call markets	
(2) Developments in the repo market and the T-Bill market	
6. Conclusion	29

1. Introduction

This report explains developments in the Japanese money markets and their functioning over the past 25 years, as part of the "Review of Monetary Policy from a Broad Perspective." While implementing a variety of unconventional monetary policy measures, the Bank of Japan has provided ample reserves that far exceed the levels of required reserves under the reserve requirement system for most of the past 25 years (Chart 1). The report assesses the impact of the unconventional monetary policy measures on the money markets by looking back on the rate formation and transaction trends in the money markets with such excess reserves. The primary subject of the analysis and assessment is the uncollateralized call market, which was the operating target for the Bank's monetary policy for a considerable period in the past. At the same time, other money markets, such as the repo market, are also examined from the viewpoint of market functioning.

Chart 1: Amounts of Current Account Balances at the Bank



Source: Bank of Japan.

The structure of this report is as follows. First, Section 2 summarizes the expected functions of the money markets. Section 3 divides the past 25 years into three phases based on the interest rate on excess reserves¹ and then summarizes trading incentives in the uncollateralized call market under the guideline for market operations in each phase, while examining the rate formation and trading trends, such as changes in market participants and trading volume. Section 4 considers notable developments regarding the functioning of the money markets other than the uncollateralized call market. Based on the discussions up to Section 4, Section 5 explains developments in the money markets

¹ This refers to the interest rate applied to current account balances held at the Bank by financial institutions eligible for the complementary deposit facility (excluding required reserve balances).

after the changes in Bank's monetary policy framework in March 2024. Finally, Section 6 presents the conclusion.

2. Expected Functions of the Money Markets

The money markets are markets for financial transactions with a maturity up to one year. In Japan, they consist of (1) interbank markets, in which only financial institutions participate (such as the call markets),² and (2) open markets, in which not only financial institutions but business corporations participate, such as the repo market, the treasury discount bill (hereinafter referred to as "T-Bill") market, the CD market, and the CP market. Of these markets, the uncollateralized call market, where the lending and borrowing of unsecured funds are conducted, serves as a marketplace where financial institutions lend and borrow short-term funds. Money markets are expected to perform two main functions as follows.

(1) Function as the starting point of the yield curve

First, the money markets have a function as the starting point of the yield curve. The Bank set the uncollateralized overnight call rate as the operating target for monetary policy for a considerable period in the past. With the overnight interest rate as the starting point, the effects of monetary policy spread to the overall financial markets through transactions with various terms and a variety of inter-market arbitrage trading. Additionally, interest rates determined by the market mechanism provide valuable information for the conduct of monetary policy. Therefore, it is important that the functioning of the money markets is maintained from the perspective of the permeation of the effects of monetary policy.³

Furthermore, in the context of interest rate benchmark reform, the uncollateralized overnight call rate (TONA: Tokyo Overnight Average rate), which is calculated and published by the Bank, was identified as the alternative risk-free rate for the Japanese yen to yen LIBOR, and its importance as an interest rate benchmark has been growing further.⁴

² Pension funds and others entrust trust banks to manage surplus funds in the interbank markets. Similarly, investment trusts manage surplus funds in the interbank markets through trust accounts of trust banks.

³ The discussion on the functioning of the money markets as the starting point of the yield curve is based on Shirakawa [2008] (available only in Japanese).

⁴ Regarding the identification of the risk-free rate for the Japanese yen, see the report published by the Study Group on Risk-Free Reference Rates [2016] (available only in Japanese).

(2) Function as a place to adjust the excess and shortage of funds

Second, the money markets have a function as a place to adjust the excess and shortage of funds. Financial institutions lend and borrow cash with each other in the money markets in order to adjust their positions associated with the receipt and payment of various funds. In Japan, the uncollateralized call market has traditionally played this role, and overnight transactions, through which financial institutions lend and borrow funds with each other from the trade day to the next business day, are most commonly used. In addition, the repo market also fulfills a role as a place to adjust the excess and shortage of funds, as GC repo transactions, which do not specify the securities to be traded, are used to manage short-term funds.

With a large amount of excess reserves due to the provision of abundant reserves by the central bank, the importance of the money markets as a place to adjust the excess and shortage of funds is considered to be declining. However, from the perspectives of (1) maintaining a platform to conduct smooth transactions for the future and (2) maintaining the aforementioned role which TONA has taken as an interest rate benchmark in recent years, it is essential that the money markets consist of diverse participants and that a certain transaction volume is ensured in the market.

3. Uncollateralized Call Market with Excess Reserves: Rate Formation and Trading Trends

This section summarizes developments in the uncollateralized call market under unconventional monetary policy by dividing the period into three phases based on the interest rate on excess reserves: (1) the quantitative easing period from 2001 to 2006, (2) the period from the introduction of the complementary deposit facility in 2008 to the introduction of the negative interest rate policy in 2016, and (3) the period from the introduction of the negative interest rate policy in 2016 to the changes in the monetary policy framework in 2024. Specifically, the section overviews trading incentives in the uncollateralized call market in each phase and then looks back on the rate formation and trading trends, such as changes in market participants and trading volume, while assessing the impact of the unconventional monetary policy measures on the functioning of the uncollateralized call market.

(1) First phase: quantitative easing period from 2001 to 2006

(Guideline for market operations and trading incentives in the money markets)

Under the quantitative easing policy introduced in March 2001 (the first phase), the target

for the Bank's market operations was changed from an interest rate (the uncollateralized overnight call rate) to a quantitative indicator (current account balances at the Bank), and the Bank actively provided reserves through operations such as purchases of bills and T-Bills.

While the majority of financial institutions with current accounts at the Bank held current account balances exceeding the levels of required reserves, trading for adjusting the excess and shortage of funds among financial institutions decreased significantly. In addition, unlike the second phase and thereafter described later, transactions for arbitrage purposes did not occur, as there was no interest on excess reserves. Accordingly, trading incentives for financial institutions declined, except for transactions for fulfilling funding needs of certain financial institutions and for the purpose of relational maintenance (Chart 2). Under these circumstances, the uncollateralized call rate stayed close to zero percent (Chart 3), and the amounts outstanding in the uncollateralized call market decreased considerably.

Chart 2: Trading Incentives

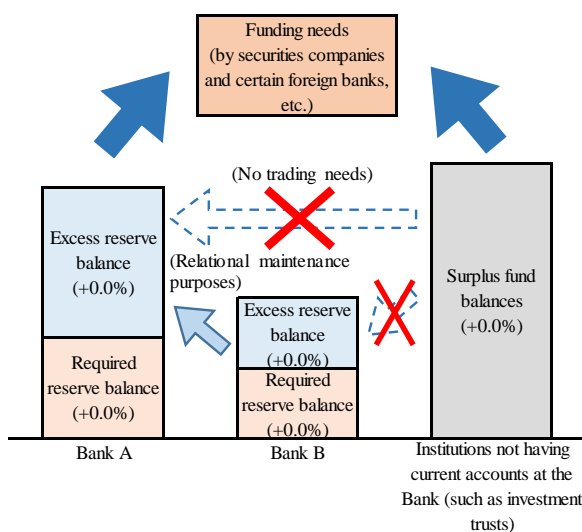
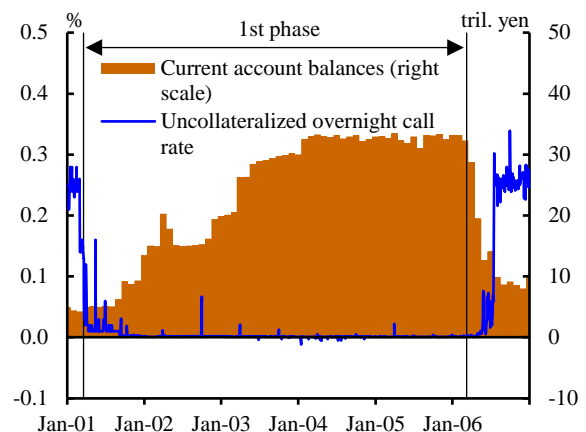


Chart 3: Uncollateralized Call Rate



Source: Bank of Japan.

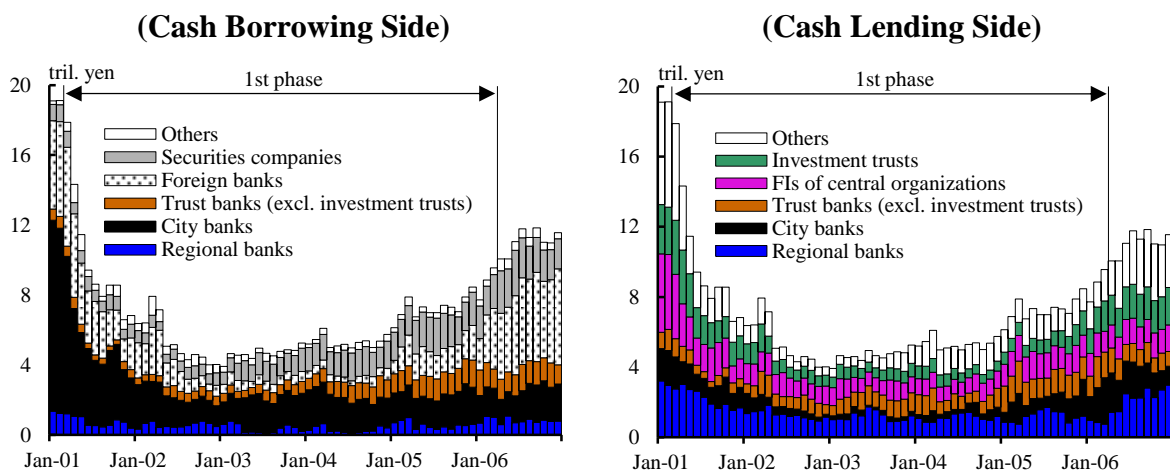
(Trading trends)

Looking at the amounts outstanding on the cash borrowing side by sector, transactions of city banks and regional banks were mainly for the purpose of relational maintenance, and the amount of cash borrowing decreased significantly (Chart 4). In this situation, transactions based on actual funding needs were concentrated among securities firms and Japanese entities of foreign banks. The amount of cash borrowing by securities firms slightly increased due to settlement funding needs. In addition, since Japanese entities of foreign banks, which were in the business expansion period, shifted the means of their

short-term yen funding to borrowing in the uncollateralized call market due to a decline in the attractiveness of conversion to yen in the FX swap market, the amount of their cash borrowing somewhat increased in the latter half of the first phase (Chart 4). Meanwhile, on the cash lending side, the amount of lending decreased across a wide range of entities.

As a result of the decline in transactions in the uncollateralized call market as a whole in the first phase, the foundation supporting smooth market transactions in a broad sense became vulnerable through reduced credit lines, the contraction of the treasury section, and a decrease in trading know-how, among other factors, resulting in a decline in the functioning of the uncollateralized call market.⁵

Chart 4: Amounts Outstanding in the Uncollateralized Call Market by Sector



Note: Transactions intermediated by *tanshi* companies. Figures are the sum of overnight and term transactions. Monthly average.
Source: Bank of Japan.

(2) Second phase: period from the introduction of the complementary deposit facility in 2008 to the introduction of the negative interest rate policy in 2016

(Guideline for market operations and trading incentives in the money markets)

In the monetary easing phase during the time of the global financial crisis triggered by subprime mortgage issues, the Bank introduced the complementary deposit facility in November 2008 to ensure stability of financial markets through further facilitating market operations. The Bank decided to apply an interest rate of plus 0.1 percent to excess reserves (current account balances held at the Bank exceeding required reserves), to which no interest had been applied before (thereafter, the interest rate level was kept at

⁵ For the decline in the functioning of the money markets during the quantitative easing period, see Shirakawa [2008] (available only in Japanese).

plus 0.1 percent until the introduction of the negative interest rate policy in 2016).⁶

Meanwhile, the target for the uncollateralized overnight call rate as the policy interest rate was lowered from around 0.3 percent to around 0.1 percent in December 2008 and it was kept unchanged until October 2010. Then, the Bank adopted the comprehensive monetary easing policy in October 2010 and encouraged the uncollateralized overnight call rate to remain at around 0 to 0.1 percent while actively providing reserves through purchases of diverse financial assets. After quantitative and qualitative monetary easing was adopted in April 2013, the target for market operations was changed from an interest rate (the uncollateralized overnight call rate) to a quantitative indicator (the monetary base), and the Bank provided extremely abundant reserves through large-scale asset purchases, mainly of Japanese government bonds (JGBs).

In the above-mentioned second phase, excess reserves continued to increase, with the Bank's fund provision mainly through asset purchases, and the pace of increase accelerated particularly after the introduction of the quantitative and qualitative monetary easing. Consequently, the perception of abundant liquidity in the financial markets gradually became stronger, and, as with the first phase, trading needs to adjust the excess and shortage of funds became limited. However, in the second phase, with the complementary deposit facility, trading incentives arose, as financial institutions that held current accounts at the Bank and received interest (hereinafter referred to as "financial institutions eligible for the complementary deposit facility") borrowed funds in the money markets at a rate below the interest rate on excess reserves and parked the funds in current accounts at the Bank (Chart 5). On the other hand, those not eligible for the complementary deposit facility, such as investment trusts, had incentives to lend funds even at a rate below the interest rate on excess reserves, as there were generally limited favorable means of managing surplus funds. As a result, a certain amount of transactions occurred in the money markets between financial institutions eligible for the complementary deposit facility and those not eligible.

⁶ The Bank decided to introduce the complementary deposit facility as a temporary measure at the Monetary Policy Meeting (MPM) held in October 2008. Its implementation period was then extended for some time at the MPM held in October 2009 from the viewpoint of conducting smooth market operations.

Chart 5: Trading Incentives

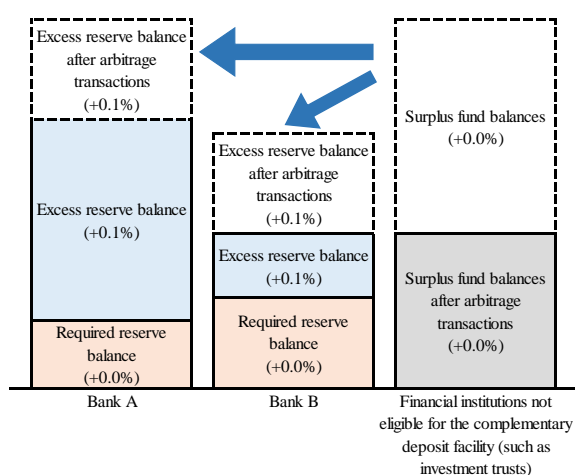
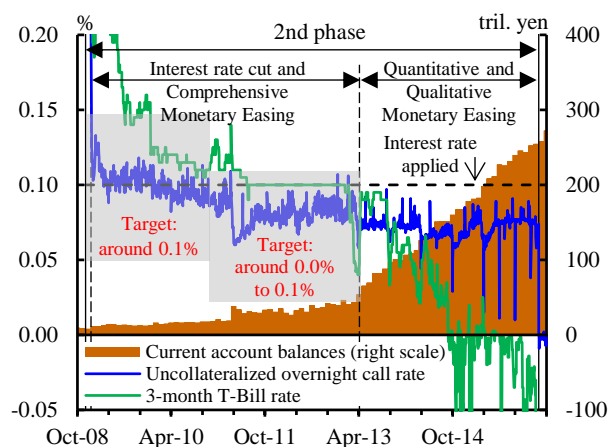


Chart 6: Uncollateralized Call Rate



Sources: Bank of Japan; Japan Bond Trading.

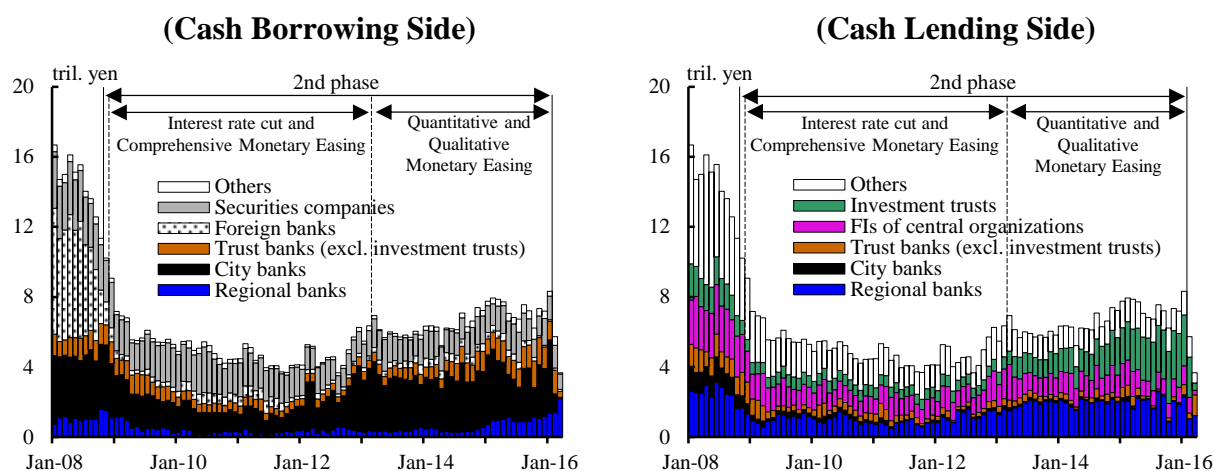
(Rate formation and trading trends)

Looking at developments in the uncollateralized overnight call rate, in the first half of the second phase (the period of interest rate cuts and comprehensive monetary easing), the rate basically moved in line with the target specified in the guideline for market operations (Chart 6). In the latter half of the second phase (the period of quantitative and qualitative monetary easing), the rate gradually declined and fell below 0.1 percent, the interest rate level applied to excess reserves, largely due to the growing perception of abundant liquidity resulting from the Bank's large-scale fund provision and a decrease in T-Bill yields following an increase in purchases by the Bank.

Regarding the amounts outstanding, transactions between financial institutions eligible for the complementary deposit facility and those not eligible were initially not very active. However, they became active in the latter half of the second phase and gradually increased (Chart 7). The increase in the amounts outstanding was partly due to changes in the level of the T-Bill rate (Chart 8). Specifically, in the first half of the second phase, with the GC repo and the T-Bill rate staying above 0.1 percent, the interest rate level applied to excess reserves (Chart 6), investment trusts on the cash lending side, which are not eligible for the complementary deposit facility, preferred investing in T-Bills to lending short-term funds in the call market. On the other hand, city banks on the cash borrowing side borrowed short-term funds in the call market for arbitrage against fund management in the repo and T-Bill markets. In this situation, there were few transactions in which both players' views on the rate were matched in the call market. Then, in the latter half of the second phase, as a result of declines in the repo and T-Bill rates due to large-scale JGB

purchases by the Bank, (1) investment trusts on the cash lending side faced difficulties in short-term fund investments and increased lending in the call market, which provided larger profit-taking opportunities, and (2) city banks actively engaged in borrowing in the call market as the recipients of such lending. Consequently, transactions in the uncollateralized call market between financial institutions eligible for the complementary deposit facility and those not eligible became active, resulting in an increase in the amounts outstanding.

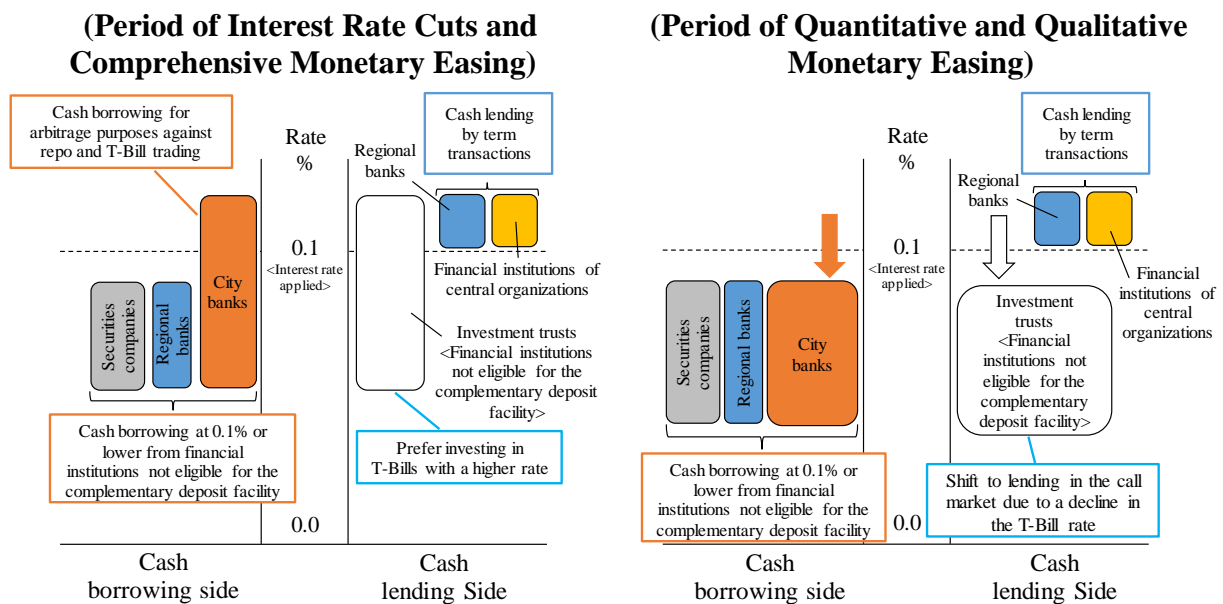
Chart 7: Amounts Outstanding in the Uncollateralized Call Market by Sector



Note: Transactions intermediated by *tanshi* companies. Figures are the sum of overnight and term transactions. Monthly average.
Source: Bank of Japan.

Thus, in the second phase, even with the strong perception of abundant liquidity with ample excess reserves, since interest was applied to excess reserves under the complementary deposit facility, a certain amount of transactions gradually occurred on a daily basis over time between financial institutions eligible for the facility and those not eligible. Under these circumstances, the functioning of the uncollateralized call market improved, compared with the first phase.

Chart 8: Participants in the Uncollateralized Call Market



(3) Third phase: period from the introduction of the negative interest rate policy in 2016 to the changes in the monetary policy framework in 2024

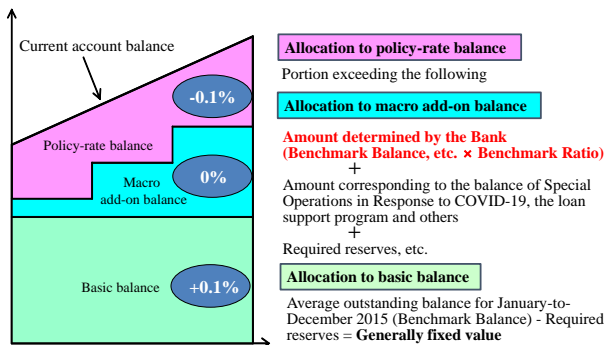
(Guideline for market operations and trading incentives in the money markets)

Under the negative interest rate policy, which was decided to be introduced in January 2016, current account balances held by financial institutions at the Bank were divided into three tiers: (1) "basic balances," the level of which was set roughly the same as that before the introduction of the negative interest rate policy; (2) "macro add-on balances" (including required reserves), which increased or decreased in line with changes in the Bank's fund provision and the Benchmark Ratio; and (3) "policy-rate balances," which were calculated by deducting "basic balances" and "macro add-on balances" from current account balances. The Bank decided to apply interest rates of plus 0.1 percent to basic balances, zero percent to macro add-on balances, and minus 0.1 percent to policy-rate balances (Chart 9).⁷ Although the Bank introduced "Quantitative and Qualitative Monetary Easing with Yield Curve Control" in September 2016 and set a target level of the long-term interest rate for market operations, the framework in which the Bank guided the short-term interest rate was maintained until the lifting of the negative interest rate policy in March 2024.

⁷ With regard to the introduction of the three-tier system, then Governor Kuroda explained in his speech delivered on March 7, 2016 that the Bank had considered how it could minimize the direct impact on financial institutions' earnings while maximizing the positive effects of the negative interest rate policy and had also taken measures to ensure that transactions continued to take place in the short-term money markets, taking into account its impact on the functioning of financial markets (for details, see Kuroda [2016]).

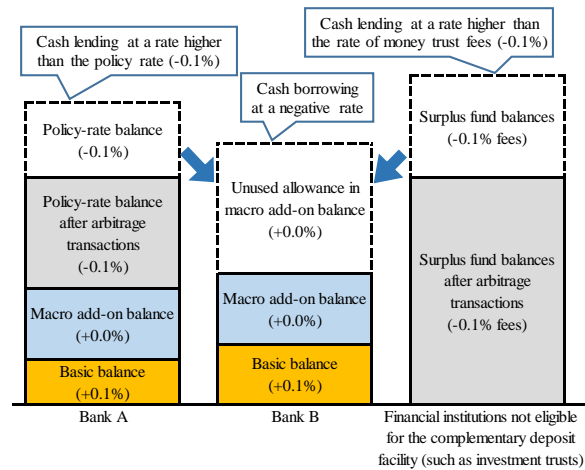
Under the three-tier system in the third phase, incentives to carry out arbitrage trading arose among financial institutions eligible for the complementary deposit facility, depending on the amount of current account balances accumulated before transactions in the money markets. Specifically, while financial institutions having policy-rate balances (to which an interest rate of minus 0.1 percent was applied) had incentives to lend short-term funds at a rate higher than minus 0.1 percent in order to reduce the balances, those having unused allowances in their macro add-on balances (to which an interest rate of zero percent was applied) had incentives to borrow short-term funds at negative interest rates and park them in current accounts at the Bank (Chart 10).

Chart 9: Overview of the Three-Tier System



Note: "Amount corresponding to the balance of Special Operations in Response to COVID-19, the loan support program and others" refers to the sum of the balances under these operations and the increase in the balance as of the end of March 2016 (the so-called "Loan Balance 2").

Chart 10: Trading Incentives



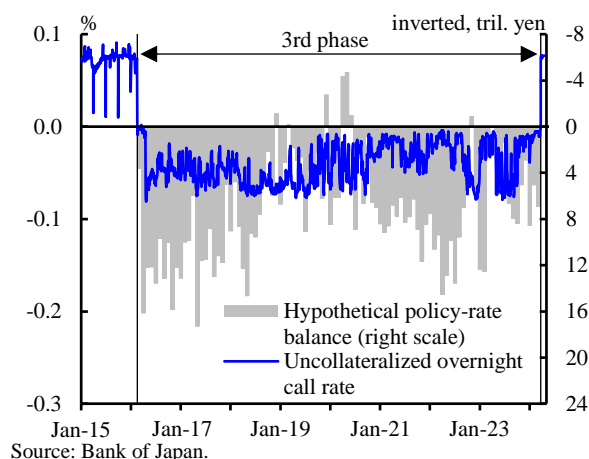
Meanwhile, for financial institutions not eligible for the complementary deposit facility, incentives to lend short-term funds at minus 0.1 percent or higher also arose, as with the case for financial institutions eligible for the facility with policy-rate balances. Investment trusts and others deposited surplus funds that could not be managed in the money markets with trust banks in the form of money trust. Under the negative interest rate policy, as trust banks charged minus 0.1 percent on money trusts as fees to pass on the burden of the negative interest rate, minus 0.1 percent of the fees served as the effective lower bound of lending rates in the uncollateralized call market for investment trusts and others.

(Rate formation and trading trends)

Under the negative interest rate policy, the uncollateralized overnight call rate generally

stayed in the range of minus 0.01 percent to minus 0.08 percent.⁸ With the aforementioned trading incentives, not only transactions between financial institutions eligible for the complementary deposit facility and those not eligible but arbitrage trading between financial institutions eligible for the facility became active, and the rate swung compared with the first and second phases (Chart 11), resulting in a significant increase in transaction amounts.

Chart 11: Uncollateralized Call Rate

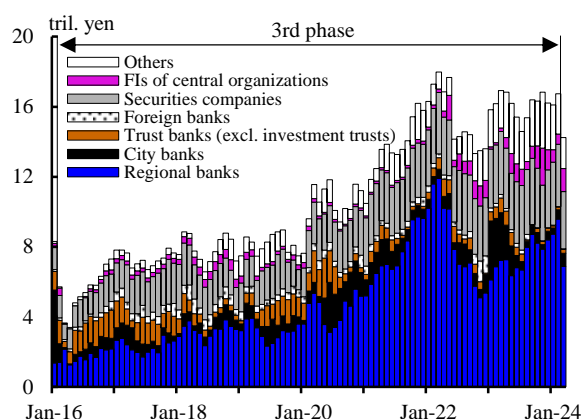


Looking at developments in the amounts outstanding by sector, regional banks increased their presence on the cash borrowing side over time, and the amount outstanding of their transactions followed an upward trend (Chart 12). In particular, the amount outstanding in the uncollateralized call market jumped after the introduction of the Special Funds-Supplying Operations to Facilitate Financing in Response to the Novel Coronavirus (COVID-19) (hereinafter referred to as "Special Operations in Response to COVID-19") in March 2020, reaching approximately 16 trillion yen by March 2024, just before the negative interest rate policy was terminated.

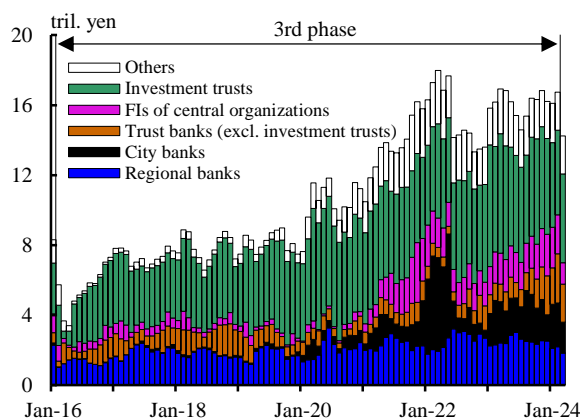
⁸ Looking at developments in the uncollateralized call rate under the negative interest rate policy in detail, the rate level rose in the latter half of the period. This could be attributed to (1) the level of hypothetical policy-rate balance (projection) decreasing from about 10 trillion yen to about 5 trillion yen in and after the August 2018 reserve maintenance period and (2) growing intention of regional banks and other players to borrow funds in the uncollateralized call market mainly due to the Bank's measure to add twice the amount of funds to the macro add-on balances, as described later in the text.

Chart 12: Amounts Outstanding in the Uncollateralized Call Market by Sector

(Cash Borrowing Side)



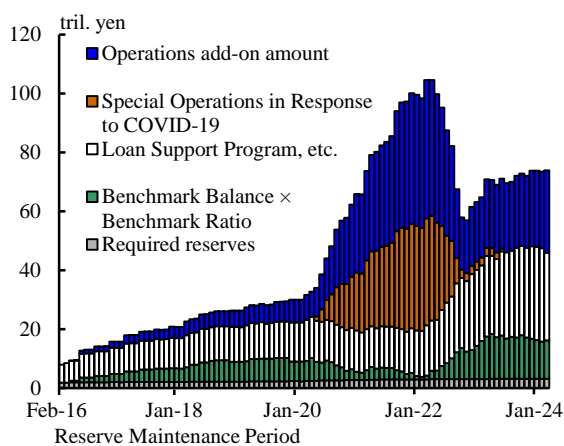
(Cash Lending Side)



Note: Transactions intermediated by *tanishi* companies. Figures are the sum of overnight and term transactions. Monthly average.
Source: Bank of Japan.

The increase in transactions was heavily encouraged by the Bank's measure to add twice the amount outstanding of funds that counterparties receive under some funds-supplying operations to their macro add-on balances (Chart 13). In fact, after the introduction of the Special Operations in Response to COVID-19, regional banks that used these operations actively engaged in arbitrage trading by borrowing cash in the uncollateralized call market and parking it to their macro add-on balances. The upper limits on regional banks' macro add-on balances temporarily decreased after these operations were discontinued, but later began to rise again as they increased the use of the Fund-Provisioning Measure to Stimulate Bank Lending. Therefore, they continued to actively borrow short-term funds in the uncollateralized call market.

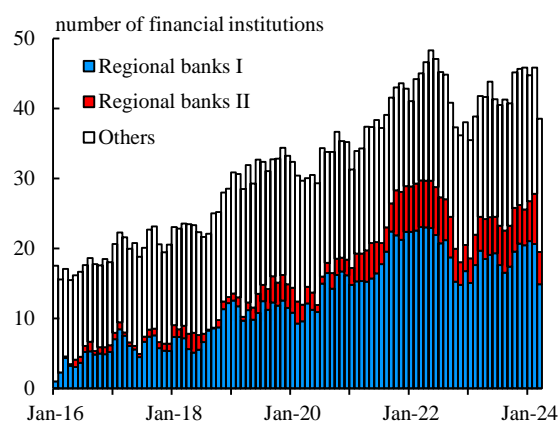
Chart 13: Upper Bound on Macro Add-on Balances of Regional Banks



Note: "Loan Support Program, etc." includes the Stimulating Bank Lending Facility, the Growth-Supporting Funding Facility, the Funds-Supplying Operation to Support Financial Institutions in Disaster Areas (including the funds-supplying operations to support financial institutions in disaster areas of the Great East Japan Earthquake and of the 2016 Kumamoto Earthquake before they were abolished), the Funds-Supplying Operations to Support Financing for Climate Change Responses, the amount based on the "Special Rules regarding Calculation of Interest of Complementary Deposit Facility for Money Reserve Funds, etc.," and the amount added or reduced in the calculation of the limit of the Macro Add-on Balance.

Source: Bank of Japan.

Chart 14: Number of Financial Institutions Borrowing Cash in the Uncollateralized Call Market by Sector



Note: The number of financial institutions that have amounts outstanding on the cash borrowing side of the uncollateralized call market is aggregated by sector based on transaction data of direct dealing (monthly average).

Source: Bank of Japan.

The growth in regional banks' funding in the call market came about with the expansion of trading networks. With individual trading data to identify the number of financial institutions that borrowed short-term funds in the uncollateralized call market, it was confirmed that the number of regional banks clearly increased under the three-tier system (Chart 14). Thus, in the third phase, particularly after the introduction of the Special Operations in Response to COVID-19, financial institutions that had not been active in the uncollateralized call market began trading, and as a result, market participants were diversified, contributing to expanding the scope of uncollateralized call market transactions.⁹ The functioning of the uncollateralized call market remained robust, owing to this expansion of trading networks. This exerted a hysteresis effect on the money markets and helped facilitate market transactions, leading to a smooth transition to positive interest rates after the negative interest rate policy was terminated, as described later.

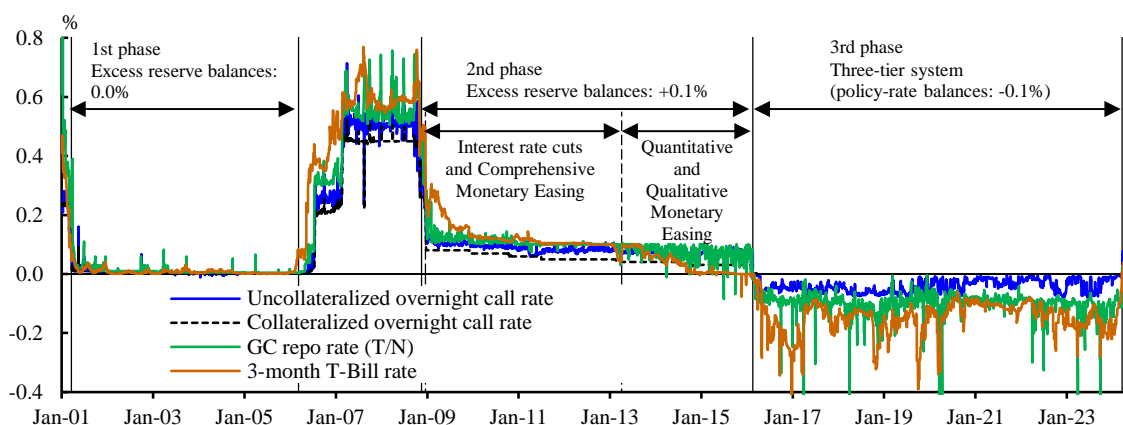
⁹ For the growth of uncollateralized call transactions and the expansion of trading networks under the three-tier system, see Box 1 of "Market Operations in Fiscal 2023" (Financial Markets Department, Bank of Japan [2024]).

4. Other Notable Developments in the Money Markets with Excess Reserves

This section reviews the money markets other than the uncollateralized call market, specifically the collateralized call market, the repo market, and the T-bill market, and examines notable developments in the functioning of these markets.

Looking at developments in various short-term interest rates over the past 25 years, the collateralized call rate, the GC repo rate, and the T-Bill rate roughly stayed at the same level as the uncollateralized call rate in the first phase and the first half of the second phase, namely, until the period of interest rate cuts and comprehensive monetary easing. However, from the latter half of the second phase, when the quantitative and qualitative monetary easing was introduced, the repo rate and the T-Bill rate gradually deviated from the uncollateralized call rate, and they clearly stayed below the uncollateralized call rate in the third phase (Chart 15). Meanwhile, major changes were observed in market size. Specifically, while the size of the collateralized call market significantly contracted in the third phase, those of the repo market and the T-Bill market greatly expanded (Chart 16).

Chart 15: Short-Term Interest Rates



Note: The collateralized call rate has not been calculated since April 2016, because there have been no transactions intermediated by *tanshi* companies. "GC repo rate (T/N)" denotes the Repo Rate (indication, aggregated) until October 26, 2007, and the Tokyo Repo Rate thereafter. The Repo Rate (indication, aggregated) is spot next.

Sources: Bank of Japan; Japan Securities Dealers Association; Japan Bond Trading.

Chart 16: Rate Formation in Short-Term Money Markets and Market Size in the 3rd Phase

		Rate	Market size (background in parentheses)
Call	Uncollateralized call	-0.1 to 0%	Expanded (active arbitrage transaction)
	Collateralized call	No transactions intermediated by <i>tanshi</i> companies	Significantly contracted (difficulties in lending under negative interest rates)
Repo	GC	Around -0.1% (significantly declined at quarter-end)	Expanded (various factors)
	SC	Yields on some issues declined to the level of the SLF rate ^(note)	Expanded (short position in JGBs expanded)
T-Bills (3-month)		Below -0.1% (significantly declined at quarter-end)	Expanded (increased issuance during the COVID-19 pandemic)
(Reference)			
CP	Issuance (3-month)	Around 0%	Expanded (increased demand for issuance under low interest rates)
	Purchase/Sale with repurchase agreement	Slightly negative	Contracted (investment incentives declined)

Note: The SLF rate refers to the upper limit on the selling yields for the Securities Lending Facility.

(1) Contraction of the collateralized call market

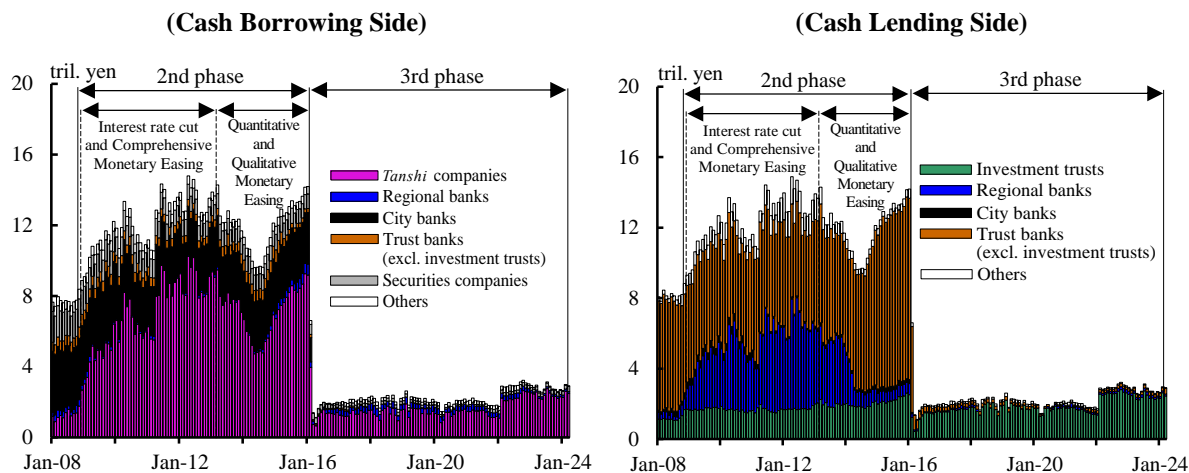
The amount outstanding in the collateralized call market increased after the global financial crisis in 2008, due to preference for secured transactions, and reached around 14 trillion yen at the end of the second phase (Chart 17). Unlike GC repo transactions, the majority of collateralized call transactions are overnight.¹⁰ In addition, conservative haircut rules are applied, while mark-to-market valuation of collateral is not required. Thus, trust banks actively used such transactions as a means of lending short-term funds entrusted by pension funds and life and non-life insurance companies. On the cash borrowing side, *tanshi* companies served as recipients of cash. *Tanshi* companies engaged in arbitrage trading in which they borrowed bonds (lent cash) in the GC repo market and borrowed cash in the collateralized call market from trust banks at a rate lower than the GC repo rate, using the bonds as collateral.

However, after the negative interest rate policy was introduced in the third phase, resulting in a decline in the collateralized call rate into a negative territory, trust banks, which had served as the main cash lending entities, nearly stopped cash lending in the collateralized call market, because they were restricted from lending entrusted funds at

¹⁰ At present, most GC repo transactions are tomorrow next (contracted on the trade date and delivered on the next business day), although there are overnight transactions in the GC repo market to some extent. For details of the amount outstanding in the GC repo market by starting date, see the results of the Bank's Tokyo Money Market Survey (Financial Markets Department, Bank of Japan [2023]).

negative interest rates. As a result, the amount outstanding in the collateralized call market declined significantly.

Chart 17: Amounts Outstanding in the Collateralized Call Market by Sector



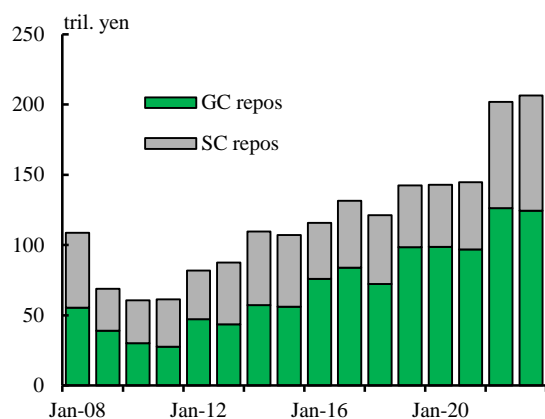
Note: Figures are the sum of overnight and term transactions. Monthly average. Figures for "Tanshi companies" are on a net basis.
Source: Bank of Japan.

(2) Expansion of the repo market and factors affecting the GC repo rate

The amount outstanding in the repo market continued on an increasing trend from the latter half of the second phase, when the quantitative and qualitative monetary easing was introduced, and has significantly increased in recent years (Chart 18). Multiple factors can be pointed out behind the active repo transactions. First, under the three-tier system during the negative interest rate policy, financial institutions having unused allowances in their macro add-on balances (to which an interest rate of zero percent was applied) had incentives to borrow short-term funds at negative interest rates and park them in current accounts at the Bank. Thus, arbitrage trading in the GC repo market also became active among financial institutions eligible for the complementary deposit facility. Second, from 2022, demand for bond borrowing from market participants grew, due to an expansion in their short positions in bonds reflecting expectations for higher interest rates. This, coupled with the Bank's large-scale JGB purchases, led to tighter supply-demand conditions for JGBs. As a result, GC-SC transactions increased, as market participants attempted to take advantage of the spread between the GC and SC repo rates.¹¹ Third, while the U.S. dollar funding premium widened, overseas investors were more eager to lend cash through GC repo transactions, and they became lenders of cash for financial institutions eligible for the complementary deposit facility (Chart 19).

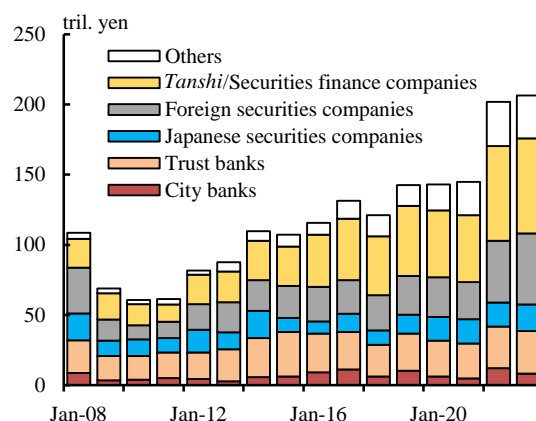
¹¹ SC transactions refer to repo transactions which specify the securities acceptable for lending and borrowing.

Chart 18: Amounts Outstanding in the Repo Market by Transaction Type



Note: Amounts outstanding as of the end of every July. Cash borrowing side.
Source: Bank of Japan.

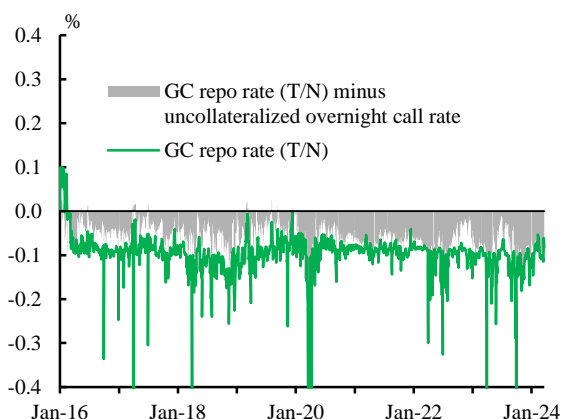
Chart 19: Amounts Outstanding in the Repo Market by Sector



Note: Amounts outstanding as of the end of every July. Cash borrowing side. Sum of GC and SC.
Source: Bank of Japan.

Looking at developments in the GC tomorrow-next repo rate, the rate started to deviate from the uncollateralized overnight call rate after the quantitative and qualitative monetary easing was introduced, and stayed below the uncollateralized call rate under the negative interest rate policy (Chart 20). This could be attributed to the tight supply-demand conditions for JGBs and the existence of the U.S. dollar funding premium. In fact, looking at the results of a regression analysis that takes the GC repo rate as the dependent variable and the uncollateralized call rate, JGB holdings by market participants other than the Bank, and the U.S. dollar funding premium as explanatory variables (Chart 21), the sign of the coefficient for JGB holdings by market participants other than the Bank is positive. This suggests that an increase in JGB holdings by market participants pushes up the GC repo rate (in other words, an increase in the Bank's holdings of JGBs pushes down the GC repo rate). In addition, the sign of the coefficient for the U.S. dollar funding premium is negative, indicating that an expansion in the dollar funding premium pushes down the GC repo rate by encouraging overseas investors to convert dollar into yen in the swap market and lend the yen cash for a short term.

Chart 20: Spread between the GC Repo Rate and the Uncollateralized Overnight Call Rate



Sources: Bank of Japan; Japan Securities Dealers Association.

Chart 21: Factors Affecting the GC Repo Rate: Estimation Results

Dependent variable: GC repo rate (% , T/N)	
Uncollateralized overnight call rate (%)	0.545 ***
JGB outstanding (excl. BOJ holdings, tril. yen)	0.002 ***
US Dollar funding premium (%)	-0.079 ***
US Dollar funding premium (%) × dummy variable for year-end funding	0.088 ***
(Constant)	-0.000

Note: The estimation period is from February 16, 2016 (start of the negative interest rate policy) through the end of July 2023. Dependent and explanatory variables are estimated with the first differences. The repo rate is estimated based on the start date. *** denotes statistical significance at the 1 percent level. The U.S. Dollar funding premium is on a 3-month term. The regression coefficients for control variables (quarter-end funding effects) are not shown in the chart.
Source: Bank of Japan.

If the GC repo rate deviates from the uncollateralized call rate, arbitrage is supposed to arise. However, that was not necessarily the case in the third phase, because market participants were somewhat different between the uncollateralized call market and the GC repo market, and only city banks were able to engage in arbitrage trading between the two markets.¹²

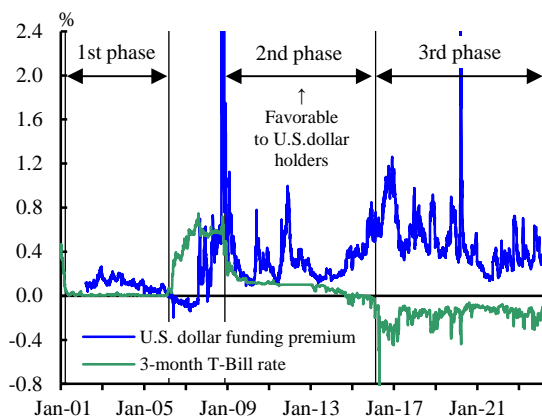
(3) Investment demand for T-Bills with negative yields

Looking at developments in the T-Bill market, the 3-month T-Bill rate stayed below minus 0.1 percent, the interest rate level applied to the policy-rate balances, in the third phase under the negative interest rate policy (Chart 22). This is because both overseas investors and domestic investors had incentives to hold T-Bills even at such low interest rates. In the U.S. dollar funding market, the U.S. dollar funding premium remained high, while Japanese banks' foreign-currency portfolio expanded after the introduction of the quantitative and qualitative monetary easing. Under these circumstances, for the holders of U.S. dollars, the perceived profitability of T-Bills remained high even when the rate of

¹² Meanwhile, under the negative interest rate policy, the Bank provided ample liquidity to the financial markets with a view to maintaining short-term interest rates in negative territory in a stable manner when the supply and demand conditions in the repo market became imbalanced and upward pressure was exerted on the GC repo rate. For instance, in fiscal 2023, the Bank conducted purchases of Japanese government securities with repurchase agreements eight times totaling 24.5 trillion yen.

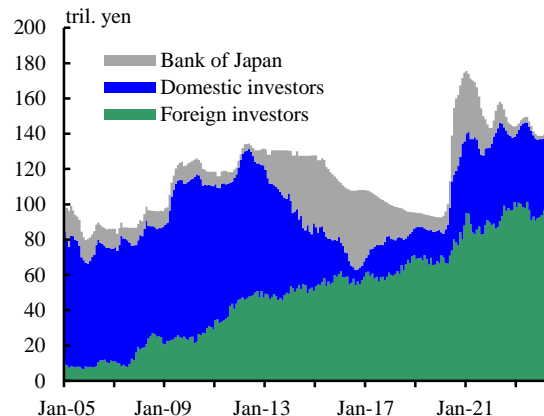
such bonds was negative, and overseas investors continued to increase their T-Bill holdings, thus expanding their presence (Chart 23). In addition, domestic banks and other financial institutions showed strong collateral demand for T-Bills even at negative interest rates.

Chart 22: U.S. Dollar Funding Premium and T-Bill Rate



Sources: Japan Bond Trading; Bloomberg.

Chart 23: Amounts Outstanding of T-Bill Holdings by Entity



Note: Figures for domestic investors are calculated by deducting the amounts outstanding of T-Bills held by the Bank and foreign investors (estimated figures) from the total.
Sources: Ministry of Finance; Bank of Japan.

5. Developments in the Money Markets after the Termination of the Negative Interest Rate Policy

The Bank decided to make changes in the monetary policy framework at the MPM held in March 2024. With a view to achieving the price stability target of 2 percent in a sustainable and stable manner, the Bank decided to conduct monetary policy as appropriate, guiding the short-term interest rate as a primary policy tool, in response to developments in economic activity and prices as well as financial conditions. Consequently, the negative interest rate policy was terminated, and the Bank set a guideline for market operations, in which it encouraged the uncollateralized overnight call rate to remain at around 0 to 0.1 percent. To achieve this guideline, the Bank also decided to apply a positive interest rate of 0.1 percent to excess reserves. The following summarizes developments in the money markets after the termination of the negative interest rate policy.¹³

¹³ For developments in the money markets through the end of fiscal 2023, see Box 3 in "Market Operations in Fiscal 2023" (Financial Markets Department, Bank of Japan [2024]). This report assesses the developments until mid-August 2024.

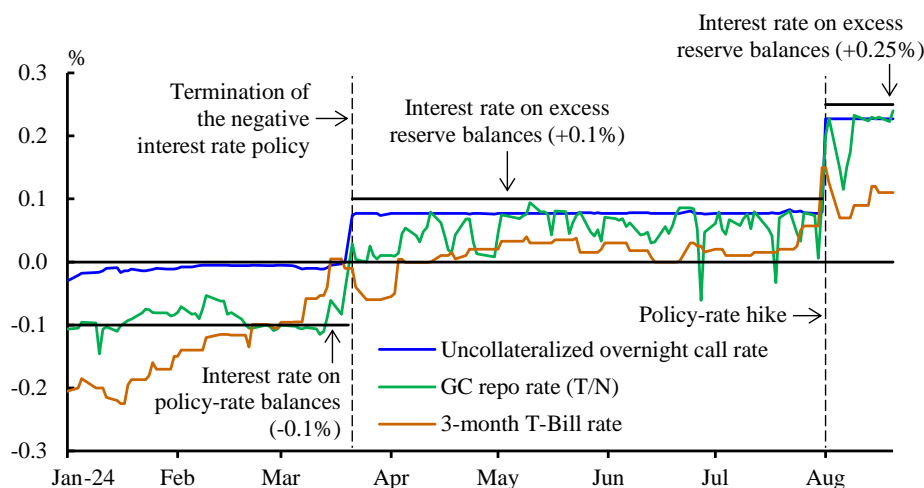
(1) Developments in the call markets

(Developments in the uncollateralized call market)

In the uncollateralized call market under the new framework, transactions took place between financial institutions eligible for the complementary deposit facility and those not eligible, as in the second phase mentioned in Section 3. Specifically, financial institutions eligible for the complementary deposit facility borrowed short-term funds at a rate below 0.1 percent and parked them in their current accounts at the Bank. Meanwhile, those not eligible, such as investment trusts, became incentivized to lend short-term funds at a rate above zero percent given the abolishment of trust bank fees for money trust.

Under these circumstances, regional banks continued to actively borrow short-term funds in the uncollateralized call market just after the interest rate of 0.1 percent was applied to excess reserves, and the uncollateralized overnight call rate immediately increased from negative territory to positive territory. Thereafter, the rate was very stable in the range of 0.075-0.08 percent, a level slightly below the interest rate of 0.1 percent on excess reserves (Chart 24). The structure of the market has not changed even after the policy rate was lifted in July 2024. The uncollateralized call rate has remained very stable in the range of 0.225-0.23 percent, a level slightly below the interest rate of 0.25 percent on excess reserves.

Chart 24: Short-Term Interest Rates after the Termination of the Negative Interest Rate Policy



Sources: Bank of Japan; Japan Securities Dealers Association; Japan Bond Trading.

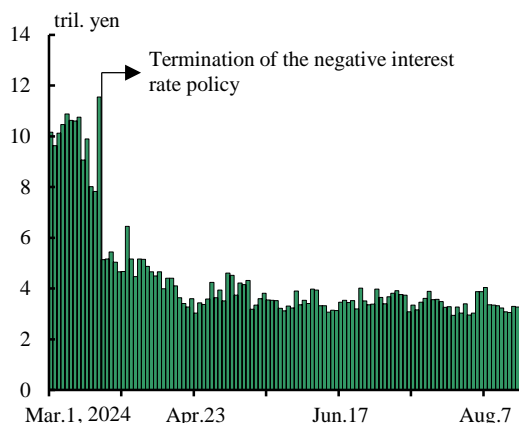
Thus, the uncollateralized call market transitioned smoothly from the world of "negative interest rates" to the one with "positive interest rates" without major disruptions. This smooth transition could be attributed to mainly two factors. First, based on developments

in the money markets under various guidelines for market operations in the past, the operational framework, in which financial institutions eligible for the complementary deposit facility and those not eligible were both incentivized to trade with each other, was introduced in March 2024. Second, the functioning of the uncollateralized call market was firmly maintained in the third phase mentioned in Section 3. With regard to the second factor, while the majority of participants in the Japanese money markets are financial institutions eligible for the complementary deposit facility, regional banks, including those who had not engaged in such trading, actively engaged in arbitrage transactions in the third phase, among other entities. As a result, market participants were diversified, and the base of participants in the uncollateralized call market expanded. Regional banks' such active stance on cash borrowing in the call market has continued even after the termination of the negative interest rate policy. Thus, the overnight uncollateralized call rate has stayed at a level slightly below the interest rate on excess reserves.

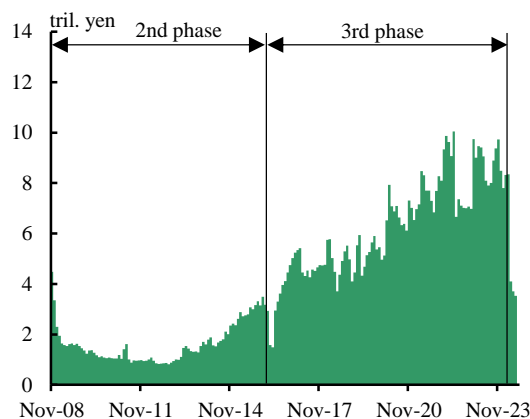
Meanwhile, the amount outstanding of overnight transactions intermediated by *tanshi* companies in the uncollateralized call market declined just after the termination of the negative interest rate policy mainly for two reasons. First, unlike during the period of the negative interest rate policy, due to the abolishment of the three-tier system, it became dispensable particularly for banks to lend cash to reduce their policy-rate balances; as a result, transactions between financial institutions eligible for the complementary deposit facility were no longer observed. Second, some financial institutions shifted from trading through *tanshi* companies to direct trading. However, the shifting to direct trading generally went round by about April 2024, and since May, the amount outstanding of overnight transactions intermediated by *tanshi* companies has remained stable at around 3 to 4 trillion yen (Chart 25).

Chart 25: Amounts Outstanding in the Uncollateralized Call Market

(Daily Developments between March and Mid-August 2024)



(Monthly Developments in the Long Term)



Note: The amounts outstanding of overnight transactions intermediated by *tanshi* companies. Figures before December 2016 include overnight transactions delivered one or more business days after the trade date, such as tomorrow next and spot next. Figures on the right chart show monthly averages.

Source: Bank of Japan.

As aforementioned, in the latter half of the third phase, the amount outstanding in the uncollateralized call market significantly increased, due mainly to the effects of the Bank's measure to add twice the amount outstanding of funds that counterparties receive under some funds-supplying operations to their macro add-on balances. From a longer-term perspective, however, the current amount outstanding of 3 to 4 trillion yen is roughly the same level as that in the latter half of the second phase, when a positive interest rate of 0.1 percent was applied to excess reserves. Therefore, it can be assessed that a reasonable amount of transactions have been taking place.¹⁴ These transactions have been made by diverse market participants, such as regional banks. Additionally, TONA, which is calculated and published based on transactions intermediated by *tanshi* companies, is referenced in the rate formation of direct trading. Thus, the market functioning of the uncollateralized call transactions intermediated by *tanshi* companies has been maintained even after the termination of the negative interest rate policy. In addition, it is considered that TONA, which is calculated based on such transactions, has continued to clearly indicate the level of prevailing market interest rates.

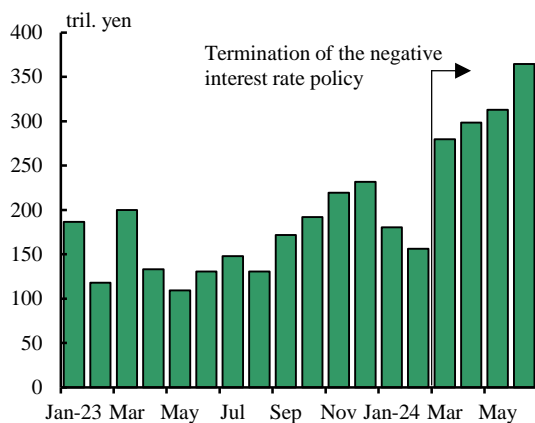
(Developments in derivative transactions referencing TONA)

Looking at developments in derivative transactions (swaps and futures) which reference

¹⁴ As pointed out in this report, some institutions shifted to direct trading after the termination of the negative interest rate policy. Given that, it is considered that the total amount outstanding in the uncollateralized call market, which is the sum of the outstanding of direct trading and trading intermediated by *tanshi* companies, has not necessarily decreased significantly since the termination of the negative interest rate policy.

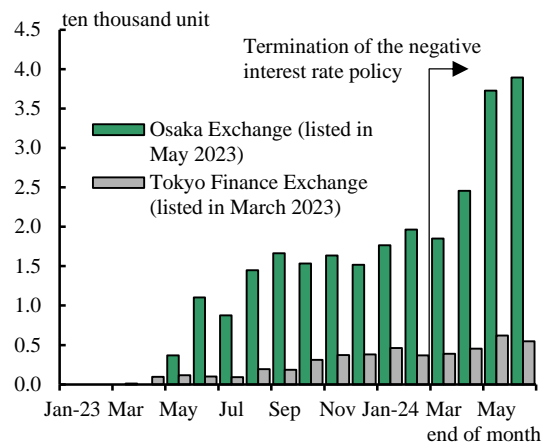
TONA, the volume of yen overnight index swap (OIS) transactions and the amount outstanding of TONA 3-month interest rate futures (TONA futures) contracts have continuously increased, due mainly to increasing needs to hedge the risk of rising interest rates in the future. The volume of yen OIS transactions (the amount of contracts cleared by the Japan Securities Clearing Corporation) was 364 trillion yen in June 2024, a record monthly high since the clearing of yen OIS contracts started in November 2014 (Chart 26). With regard to TONA interest rate futures, the amount outstanding of 3-month interest rate futures contracts listed in the Tokyo Financial Exchange and the Osaka Exchange increased to record high levels since they were listed in 2023 (Chart 27).

Chart 26: Volume of Yen OIS Transactions



Note: Figures are those for the amount of cleared contracts.
Source: Japan Securities Clearing Corporation.

Chart 27: Amounts Outstanding of TONA Futures Contracts

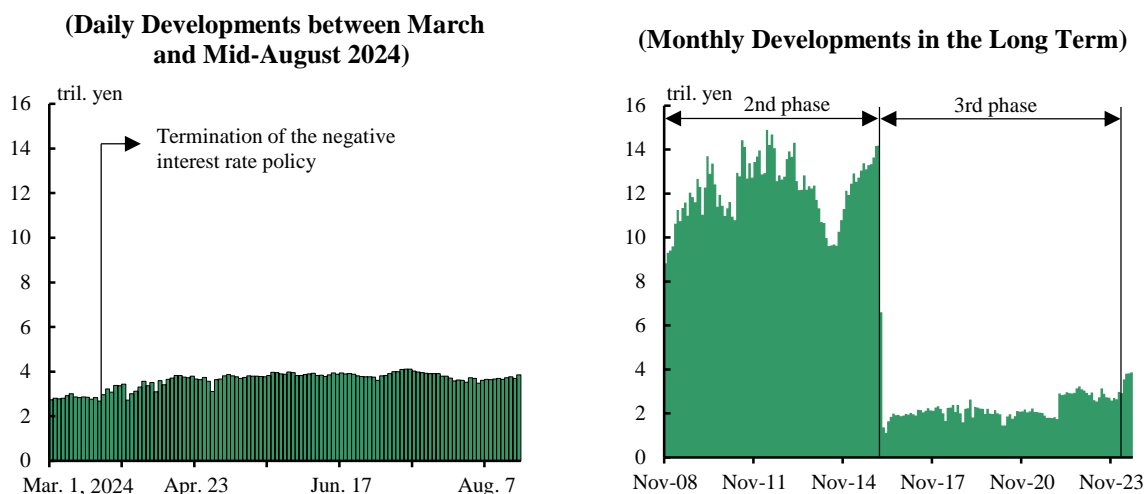


Sources: Osaka Exchange; Tokyo Financial Exchange.

(Developments in the collateralized call market)

As aforementioned, the collateralized call market contracted significantly in the third phase. However, its amount outstanding has been growing to some extent since the termination of the negative interest rate policy (Chart 28). Specifically, on the cash lending side, investment trusts and others have resumed lending cash, while the collateralized call rate has stayed in positive territory. Meanwhile, on the cash borrowing side, while the GC repo rate has been rising gradually and staying above the collateralized call rate, *tanshi* companies, as observed in the second phase (see Section 4 (1)), have started engaging in arbitrage trading in which they borrow cash (lend securities) in the collateralized call market and lend cash (borrow securities) in the GC repo market.

Chart 28: Amounts Outstanding in the Collateralized Call Market



Note: Figures are the sum of overnight and term transactions. Figures on the right chart show monthly averages.
Source: Bank of Japan.

However, with the collateralized call rate rising only slightly, investment trusts, which were major cash lenders in the second phase, have not yet actively lent their excess funds. In addition, city banks, which were the major cash borrowers following *tanshi* companies in the second phase, have not conducted collateralized call transactions of late, as they shifted to repo transactions. Under these circumstances, the rebound in the amount outstanding in the collateralized call market as a whole has remained moderate.

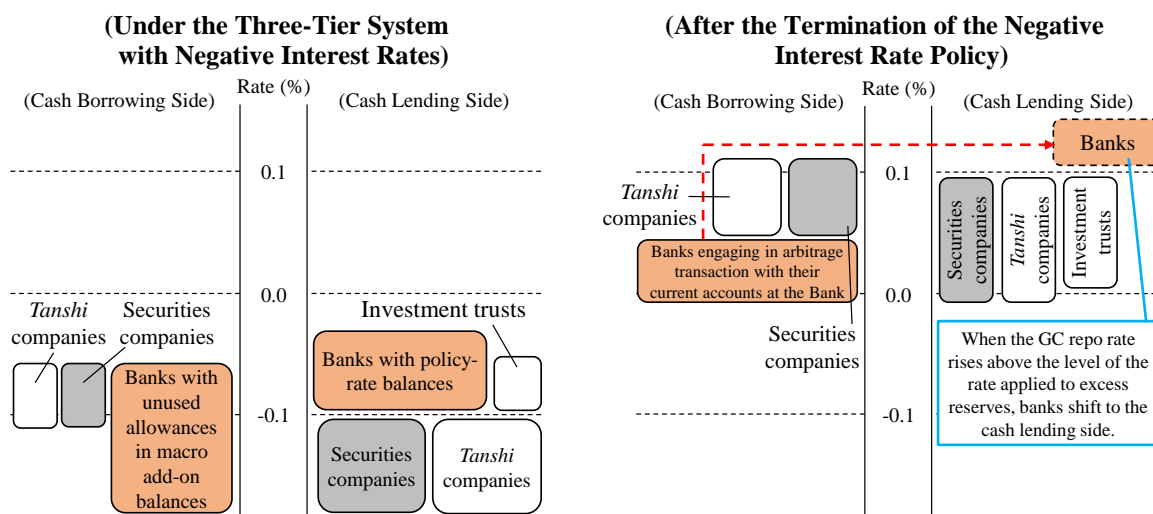
(2) Developments in the repo market and the T-Bill market

(GC repo market)

Turning to the structure of daily cash borrowing and lending in the GC repo market, under the three-tier system during the negative interest rate policy, major cash borrowers were securities firms funding their inventories and banks engaging in arbitrage trading by borrowing cash and parking it to their macro add-on balances, to which a zero interest rate was applied. On the other hand, the major cash lenders were securities firms that needed to borrow securities and banks with policy-rate balances. Since the termination of the negative interest rate policy, the structure of cash borrowing and lending has changed (Chart 29). On the cash borrowing side, the following became major cash borrowers: securities firms funding their inventories and banks engaging in arbitrage trading by borrowing cash and parking it to their current account balances at the Bank, to which a positive interest rate of 0.1 percent was applied. On the cash lending side, securities firms that need to borrow securities and investment trusts that lend surplus funds became major cash lenders, since it became no longer necessary for banks to reduce their policy-rate

balance.

Chart 29: Participants in the GC Repo Market



Under these circumstances, the GC tomorrow-next repo rate rose to positive territory from its previous level of around minus 0.1 percent after the termination of the negative interest rate policy. However, the rate remained only slightly positive until the end of March 2024, due mainly to fiscal year-end factors (Chart 24). After the start of April, securities firms' inventory funding needs increased following the issuance and bidding of JGBs, and city banks borrowed cash at a rather higher rate. As a result, the GC repo rate gradually rose and the spread between the GC repo rate and the uncollateralized call rate narrowed compared to the third phase. When securities firms' inventories increased, the repo rate temporarily rose above the 0.1 percent level (the rate applied to excess reserves). However, as financial institutions eligible for the complementary deposit facility, such as city banks, actively lent cash at a rate slightly higher than 0.1 percent, the GC repo rate did not continue to stay above 0.1 percent.

Thus, the level of the GC repo rate has fluctuated depending on the amount of demand for inventory funding by securities firms. However, when the rate declines, city banks have actively borrowed cash,¹⁵ and when it rises above the rate applied to excess reserves, city banks have actively lent cash. As a result, the upper and lower bounds of the GC repo rate have been defined mainly by city banks' view on the cash lending and borrowing rates, and the GC repo rate has generally remained within the upper and lower bounds. Such structure of rate formation has remained in place even after the policy rate hike in July 2024.

¹⁵ At the end of June 2024, some market participants reduced their cash borrowing due to their fiscal year-end, and the GC repo rate temporarily dropped significantly.

(T-Bill market)

With regard to the T-Bill market after the termination of the negative interest rate policy, yields on 3-month, 6-month, and 1-year T-Bills have generally stayed in positive territory in a stable manner. By maturity, yields on 3-month T-Bills, in particular, have remained at a level somewhat below the rate applied to excess reserves, even after the policy rate hike in July 2024 (Chart 24), due to (1) demand from overseas investors for foreign exchange and currency swaps (dollar-yen conversion) owing to the existence of the U.S. dollar funding premium and (2) strong collateral demand from domestic banks.

Meanwhile, collateral demand for T-Bills from domestic banks could decline in the future affected by (1) the change in the structure of long-term funds-supplying operations, such as the Fund-Provisioning Measure to Stimulate Bank Lending, in accordance with the changes in the monetary policy framework in March 2024,¹⁶ and (2) the decision at the MPM held in July 2024 to provide loans on a floating rate basis under the Fund-Provisioning Measure to Stimulate Bank Lending.

In the first phase, in which the policy rate was raised after the quantitative monetary easing period, yields on 3-month T-Bills rose earlier than the uncollateralized call rate and the GC repo rate, reflecting expectations of future interest rate hikes (Chart 15). Compared with that time, the pace of increase in T-Bill rates has been moderate after the termination of the negative interest rate policy, even amid expectations of interest rate hikes in the future. This indicates strong demand from investors both at home and abroad.

6. Conclusion

Looking back on the developments in the money markets with excess reserves, in the first phase, in which the complementary deposit facility did not exist and a zero percent interest rate was applied to excess reserves, trading incentives were lost in the money markets and the functioning of the uncollateralized call market significantly declined. However, after the complementary deposit facility was introduced and trading incentives arose in the money markets, transactions were restored in the uncollateralized call market between financial institutions eligible for the complementary deposit facility and those not eligible, and the functioning of the uncollateralized call market gradually improved in the second phase. Subsequently, even under the negative interest rate policy in the third

¹⁶ For instance, under the Fund-Provisioning Measure to Stimulate Bank Lending, the Bank decided to provide loans with an interest rate of 0.1 percent (previously zero percent) and a duration of one year (previously four years). The maximum amount of funds that each eligible counterparty can borrow was set to be equivalent to the net increase in its amount outstanding of loans (previously up to twice the amount of increase).

phase, the market functioning remained robust. Meanwhile, the functioning of the GC repo market also remained robust in terms of rate formation, the variety of market participants, and trading volume.

Following the decision to make changes in the monetary policy framework in March 2024 and the termination of the negative interest rate policy, the money markets transitioned smoothly from the world of "negative interest rates" to the one with "positive interest rates." This was attributed to the fact that the functioning of the money markets remained robust in the third phase, right before the transition, owing to the diversification of market participants and the resultant expansion of trading networks, among other factors.

With regard to the outlook, particular attention needs to be paid to the following two points: (1) as "a state with positive interest rates" gradually takes root, how the mechanism of rate formation will be established and how transactions will be developed in the money markets, (2) as the reduction in the purchases of JGBs by the Bank progresses in line with the decision in July 2024, to what extent the supply-demand conditions for JGBs will ease and what kind of impact will be made on the rate formation in the GC repo market and the T-Bill market. In any case, given the role which TONA has taken as an interest rate benchmark in recent years, in addition to the fact that the Bank set the short-term interest rate as its primary policy tool, it is becoming ever more important that the functioning of the money markets remains robust. From these viewpoints, the Bank intends to continue to carefully monitor the rate formation and trading trends in the money markets and pay attention to the functioning of the money markets.

Reference

Financial Markets Department, Bank of Japan [2023], "Trends in the Money Market in Japan -- Results of the Tokyo Money Market Survey (August 2023) --."

Financial Markets Department, Bank of Japan [2024], "Market Operations in Fiscal 2023."

Kuroda [2016], "Answers to Frequently Asked Questions on ""Quantitative and Qualitative Monetary Easing (QQE) with a Negative Interest Rate, "" speech at a meeting held by the Yomiuri International Economic Society in Tokyo.

Shirakawa [2008], "The Functioning of Money Markets and Central Banks' Market Operations," speech at a meeting on market operations with eligible counterparties (available only in Japanese).

Study Group on Risk-Free Reference Rates [2016], "Report for the Identification of the Risk Free Rate for the Japanese Yen" (available only in Japanese).