日本銀行
BANK OF JAPAN

Review of Monetary Policy from a Broad Perspective

(English translation prepared by the Bank's staff based on the Japanese original)

Foreword by the Governor

The Bank of Japan has two missions: to achieve price stability, and to ensure the stability of the financial system. In Japan, achieving price stability has been a challenge for a long period of 25 years since the late 1990s, when the economy fell into deflation. During that period, the Bank implemented various monetary easing measures, and these measures have interacted with and influenced wide areas of Japan's economic activity, prices, and financial sector. With these interactions in mind, in order to deepen its understanding of monetary policy over this period and gain insights that would be useful for future policy conduct, the Bank decided at its April 2023 Monetary Policy Meeting to conduct a review of monetary policy from a broad perspective (hereinafter, the Review).

This report provides an overview of the results of the Review, which the Bank conducted over a period of around a year and a half, from April 2023. In proceeding with the Review, the Bank not only worked on a number of relevant analyses but also included various outreach initiatives, in order to incorporate a wide range of external expertise and to enhance the objectivity and transparency of the Review. These initiatives included surveys and interviews with households, firms, and financial institutions; exchanges of views on occasions such as meetings of the Bank's Policy Board members with local and business leaders; and workshops involving experts from home and abroad. Moreover, prior to the release of this report, the Bank asked academic experts to provide commentaries on the results of the Review. The commentaries are included in this report.

The Bank will continue to conduct monetary policy as appropriate toward achieving the price stability target in a sustainable and stable manner, while making use of the findings of the Review.

December 2024

Governor of the Bank of Japan

Major Initiatives for the Review of Monetary Policy from a Broad Perspective

April 2023	Monetary Policy Meeting: the Bank decided to conduct the Review
June 2023	Monetary Policy Meeting: Discussions by the Policy Board on the Themes and the Process of the Review
June 2023	Program on International Financial Systems and the Bank of Japan, Monetary Policy Seminar
June 2023	Meeting with Local Leaders (A total of 17 meetings were conducted nationwide between June 2023 and March 2024.)
July 2023	Publication of the Approach to Conducting the Review
October 2023	Conduct of the *Bond Market Survey, Special Survey*
October 2023	Monetary Policy Meeting: Staff Reports and Discussions by the Policy Board on the Basic Thinking on Central Bank Finances and Monetary Policy Conduct
November 2023	Conduct of the *Survey regarding Corporate Behavior since the Mid-1990s*
November 2023	10th Joint Conference: CARF and Bank of Japan Research and Statistics Department: "Changes in the Global Economic Landscape and Japan's Economy"
December 2023	1st Workshop on the Review: "The Effects and Side Effects of Unconventional Monetary Policy"
December 2023	Monetary Policy Meeting: Staff Reports and Discussions by the Policy Board on Developments in Economic Activity and Prices over the Past 25 Years
January 2024	Monetary Policy Meeting: Staff Reports and Discussions by the Policy Board on the Positive and Side Effects of the Bank's Unconventional Monetary Policy Measures
February 2024	Conduct of the Public Consultation on the Review
February 2024	Conduct of the *Opinion Survey on the General Public's Views and Behavior* (added special survey items)

March 2024	Monetary Policy Meeting: Staff Reports and Discussions by the Policy Board on the Impact of the Unconventional Monetary Policy on Financial Markets, Financial Institutions' Behavior and the Financial System
May 2024	2nd Workshop on the Review: "Economic Activity, Prices, and Monetary Policy over the Past 25 Years"
May 2024	2024 BOJ-IMES Conference: "Price Dynamics and Monetary Policy Challenges – Lessons Learned and Going Forward –"
June 2024	Program on International Financial Systems and the Bank of Japan, Monetary Policy Seminar
October 2024	Monetary Policy Meeting: Staff Reports and Discussions by the Policy Board on the Approach for Compiling the Final Results and the Schedule for Finalization
December 2024	Monetary Policy Meeting: Publication of the Final Report of the Review

Policy Board of the Bank

Left to right: TAKATA Hajime (Member of the Policy Board), NOGUCHI Asahi (Member of the Policy Board), ADACHI Seiji (Member of the Policy Board), HIMINO Ryozo (Deputy Governor), UEDA Kazuo (Governor), UCHIDA Shinichi (Deputy Governor), NAKAMURA Toyoaki (Member of the Policy Board), NAKAGAWA Junko (Member of the Policy Board), TAMURA Naoki (Member of the Policy Board).

Review of Monetary Policy from a Broad Perspective

Contents

The Bank's View[1]

I. Developments in Economic Activity, Prices, and Financial Conditions and the Conduct of Monetary Policy in Japan over the Past 25 Years

A. Developments in Economic Activity, Prices, and Financial Conditions in Japan since the Latter Half of the 1990s

Japan fell into deflation in the latter half of the 1990s, experiencing a sustained decline in prices. Although subsequently there were phases in which the rate of change in prices temporarily turned positive, Japan generally continued to experience moderate deflation until the early 2010s. The reasons for this prolonged period of moderate deflation can be broadly divided into three main points.

First, with a declining trend in the natural rate of interest, which is the real interest rate neutral to economic activity and prices, conventional monetary policy measures were unable to sufficiently stimulate the economy due to the effective lower bound on nominal short-term interest rates, resulting in a chronic shortage of demand. As asset prices fell sharply and growth expectations took a downward turn after the burst of the bubble in the early 1990s, firms became more cautious in their risk-taking. Thereafter, such firms' behavior intensified further, against the backdrop of instability of the financial system from the late 1990s to the early 2000s. In the mid-2000s, there was a cyclical increase in business fixed investment due to factors such as progress by firms and financial institutions in their balance sheet adjustments; subsequently, however, firms fundamentally remained cautious in their activities, particularly amid the Global Financial Crisis and the Great East Japan Earthquake. Delayed responses to developments including globalization and demographic changes also contributed to pushing down the natural rate of interest.

Second, from the mid-1990s to the 2000s, factors such as intensifying price competition with imports from emerging economies due to globalization and the global spread of technological innovations in industries such as IT-related ones also acted to push prices downward. Moreover, the appreciation of the yen against other currencies in the period following the Global Financial Crisis in the late 2000s also exerted downward pressure on prices.

Third, the prolonged moderate deflation caused by the sluggish demand and the changes in the competitive environment described above led to the entrenchment of behavior and a mindset based on the assumption that wages and prices will not increase easily. Under these circumstances, medium- to long-term inflation expectations were also unstable at low levels. In addition to actual inflation, medium- to long-term inflation expectations also remained low, leading to a situation where prices became even less likely to increase.

In 2013, the Bank set a price stability target of 2 percent and introduced Quantitative and Qualitative

[1] "The Bank's View," which outlines the Bank's assessment in the Review of Monetary Policy from a Broad Perspective, was decided by the Policy Board at the Monetary Policy Meeting held on December 18 and 19, 2024.

Monetary Easing (QQE), a large-scale monetary easing framework. The government also implemented various measures, including large-scale fiscal stimulus packages. During this period, following its appreciation in the wake of the Global Financial Crisis, there was a correction of the strong yen, partly due to changes in conditions abroad. Corporate profits recovered, especially among large firms, and stock prices rose. Under these circumstances, the chronic shortage of demand that had persisted for a long time began to abate, and with inflation expectations rising somewhat, Japan was no longer in deflation in the sense of a sustained decline in prices. However, with firms remaining cautious, inflation in the 2010s remained below 2 percent due to factors such as the following: (1) there remained room for increases in the labor supply, such as from women and seniors, and supply did increase elastically in response to the tightening of labor market conditions, so that there was no substantial rise in upward pressure on wages and prices; and (2) with the rate of increase in actual wages and prices being limited, it took time for the behavior and mindset based on the assumption that wages and prices will not increase easily to change.

This situation has been changing in the 2020s. In the labor market, with the room for additional labor supply shrinking and with the number of employed persons having already increased due to the prolonged monetary easing and other factors, labor shortages are becoming more pronounced. Moreover, amid a significant rise in import prices, coupled with various government measures to support firms to pass on higher input prices to their selling prices and raise wages, firms' behavior has shifted more toward raising wages and prices, which suggests a change in the behavior and mindset based on the assumption that wages and prices will not increase easily. With such changes underway, medium- to long-term inflation expectations are also rising toward 2 percent. Meanwhile, the long-standing global disinflationary trend appears to be changing. It is also necessary to pay close attention to the impact that factors such as a changing trend of globalization, geopolitical risks, and the developments toward decarbonization may have on inflation in Japan.

B. Monetary Policy Conduct until the Early 2010s

In response to the developments in economic activity and prices since the burst of the bubble, the Bank cut policy rates in the late 1990s. In 1999, the Bank introduced the world's first zero interest rate policy and forward guidance, which it called the "policy duration effect" at the time. Subsequently, the Bank successively introduced a range of unconventional monetary policy measures, including the Quantitative Easing Policy in the 2000s, a series of monetary easing measures after the 2008 Global Financial Crisis, and the Comprehensive Monetary Easing Policy in the early 2010s.

The effects of these policies need to be evaluated in light of the challenges and external environment the economy faced at the time when each policy measure was introduced. Developments in real interest rates, which are often regarded as the primary channels for the effects of monetary easing, show that, with sluggish inflation and inflation expectations, the policies did not substantially lower real interest rates through the early 2010s. In the 2000s, the decline in longer-term nominal interest rates was achieved primarily through forward guidance, while the Bank provided funds mainly through short-term lending.

Under the Comprehensive Monetary Easing Policy introduced in 2010, the Bank, in addition to laying out forward guidance, established the Asset Purchase Program to increase Japanese government bond (JGB) purchases. The purchases were limited to JGBs with a remaining maturity of three years or less, so that the effects of such purchases in terms of pushing down the yield curve as a whole were limited.

However, these developments in real interest rates should not be the sole criterion for evaluating monetary policy at the time. From the end of the 1990s to the mid-2000s, when the transmission of monetary easing effects was impeded due to the remaining risk of instability of the financial system, the policy of providing large amounts of liquidity to financial institutions was highly effective in the sense that it mitigated liquidity concerns and averted a further deterioration of the economy. In a similar vein, during the phase after the Global Financial Crisis, the Bank took a whole variety of measures to ensure the stability of financial markets and support corporate financing, and this mitigated the impact of the unprecedented financial crisis on economic activity, prices, and financial conditions in Japan. However, even after the acute deterioration in economic and financial conditions had subsided, the recovery of overseas economies remained sluggish, especially among advanced economies, and the European debt crisis gradually became more serious. Global financial markets remained unstable, and with U.S. and European central banks introducing powerful monetary easing policies and interest rates in Japan already low and leaving little room for further declines, the gap between interest rates in Japan and abroad narrowed considerably, leading to a continued appreciation of the yen. Domestically, the Great East Japan Earthquake had a serious impact on the economy. Given these severe circumstances, the Bank under its Comprehensive Monetary Easing Policy pursued more powerful monetary easing than in the 2000s; however, this still did not provide sufficient stimulus to economic activity and prices.

C. Impact of the Large-Scale Monetary Easing since 2013 on Economic Activity and Prices

The Bank set a price stability target of 2 percent in January 2013 and introduced QQE in April of that year. It subsequently expanded QQE in October 2014, introduced QQE with a Negative Interest Rate in January 2016, and Quantitative and Qualitative Monetary Easing with Yield Curve Control (QQE with YCC) in September 2016.

In terms of the transmission mechanisms through which this large-scale monetary easing would affect economic activity and prices, the Bank assumed that the primary channels would be a decline in real interest rates through (1) higher inflation expectations brought about by the Bank influencing expectations and (2) a reduction in nominal interest rates as a result of measures such as large-scale JGB purchases. Looking at these points in more detail, first, the large-scale monetary easing appears to have had an impact to some degree on inflation expectations (forward-looking expectations formation). However, adaptive expectations formation has had a larger impact on the formation of inflation expectations in Japan, and such expectations also have been strongly influenced by past experience. It was not easy to change the behavior and mindset based on the assumption that wages and prices will not increase easily, and influencing expectations alone was not sufficiently effective to anchor inflation

at 2 percent. Second, with regard to nominal interest rates, the Bank exerted downward pressure across the yield curve by conducting large-scale purchases of JGBs, including long-term and super-long-term JGBs. Moreover, in 2016, the Bank introduced the Negative Interest Rate Policy, which, in combination with large-scale JGB purchases, further strengthened downward pressure on nominal interest rates.

The above monetary policy lowered real interest rates into negative territory, creating accommodative financial conditions. Combined with changes in the external environment, such as the reversal of the yen's appreciation, large-scale monetary easing likely worked to push up economic activity and prices. Analyses using several different models show that such easing has pushed up economic activity and prices to some extent, and has thereby contributed to moving Japan's economy out of a state of deflation, although the results of the analyses need to be interpreted with considerable latitude. Under these circumstances, tightened labor market conditions were achieved, partly reflecting demographic changes. This, together with factors such as the sharp rise in import prices, likely has led to increases in wages and prices after the turn of the 2020s. However, mainly due to the difficulties of influencing expectations as mentioned earlier, the effect of the large-scale monetary easing was not as large as expected at the time when it was introduced – the Bank initially aimed to achieve the price stability target of 2 percent at the earliest possible time, with a time horizon of about two years. The large-scale monetary easing also likely has had an impact on economic activity and prices through financial and capital markets, such as developments in exchange rates and stock prices. It should be noted, however, that the interaction between monetary policy and developments in stock prices and exchange rates varies substantially over time and is highly uncertain.

D. Impact of Large-Scale Monetary Easing on Market Functioning, the Functioning of Financial Intermediation, and the Growth Potential

It has been argued that large-scale monetary easing has had an impact on the functioning of financial markets and financial intermediation, as well as on the growth potential of Japan's economy (the supply side of the economy).

Looking at the impact on the functioning of financial markets, the Bank, based on the recognition that large-scale monetary easing can affect the functioning of the JGB market, has modified its operations in response to the changing circumstances. However, amid the prolonged large-scale JGB purchases, the functioning of the JGB market deteriorated as the effect of YCC in suppressing long-term interest rates became more pronounced. In addition, there were phases where the deterioration in the functioning of the JGB market appears to have spilled over into the functioning of other financial markets.

With regard to the impact on the functioning of financial intermediation, the decline in interest rates resulting from large-scale monetary easing increased corporate demand for funds through improvements in the economy. For financial institutions, the decline in interest rates has exerted downward pressure on their interest margins on loans and other assets, while their capital has been enhanced through factors such as a lower credit risk. Taking all these factors into account, there is no evidence that large-scale

monetary easing has impeded financial intermediation activities. Moreover, even under the prolonged accommodative financial environment, there have been no signs of a buildup of major financial imbalances.

When monetary easing continues for a long period of time, monetary policy could also have an impact on the supply side of the economy in the medium- to long-term. In this regard, two transmission channels can be considered: (1) boosting the economy through monetary easing could exert positive effects on the supply side through capital accumulation and human capital accumulation as a result of the avoidance of unemployment, and (2) prolonged monetary easing may lead to distortions in resource allocation and exert adverse effects on productivity growth. On this point, no clear conclusions have been reached, either positive or negative, based on the empirical analyses using data that are currently available, and further analysis is necessary.

E. Assessment of the Effects and Side Effects of Large-Scale Monetary Easing

It can be assessed that the large-scale monetary easing since 2013 (1) did not have as large an upward effect on prices as originally expected, partly because it was not easy to influence expectations, but (2) had a positive effect to some degree on economic activity and prices. In terms of the side effects, the large-scale monetary easing did have a negative impact on the functioning of the JGB market. However, the degree of functioning of the JGB market has been improving recently. In addition, although large-scale monetary easing led to a contraction of financial institutions' lending margins, there is no evidence at this point that it has impeded financial intermediation activities. Moreover, no clear conclusions have been reached regarding the impact on the supply side of the economy, either positive or negative.

The assessment of the effects and side effects of large-scale monetary easing is as follows. Although there have been certain side effects on financial markets and financial institutions' profits, the overall effect on the Japanese economy so far appears to have been positive. However, attention should be paid to the possibility that the negative effects may become larger in the future, such as the possibility that the functioning of the JGB market does not fully recover or possible side effects of large-scale monetary easing materialize at a later date. For instance, the Bank's share of JGB holdings is expected to remain extremely large for some time, and it may take a period of time for the functioning of the JGB market to recover. Moreover, some of the increase in bank lending during the period of large-scale monetary easing may contain loans to borrowers with relatively low resilience to a decline in income or an increase in loan interest rates; in addition, the durations of loans provided and bonds held by financial institutions have been getting longer as their profitability has been diminishing from a somewhat longer-run perspective. These points could be factors that impede financial intermediation activities in the event of a significant change in the external environment going forward.

II. Implications for the Future Conduct of Monetary Policy

A. The Bank's Thinking on Unconventional Monetary Policy

The various unconventional monetary policy measures the Bank implemented were effective in pushing up Japan's economic activity and prices. However, the quantitative degree of their effects are uncertain compared with conventional monetary policy measures, which are conducted by guiding short-term interest rates. Moreover, when such unconventional measures are implemented at a large scale for a long period of time, they could bring about side effects on the functioning of financial markets and the profits of financial institutions. Thus, unconventional monetary policy measures cannot fully substitute for conventional monetary policy measures that control short-term interest rates. Going forward, if it becomes necessary to implement unconventional monetary policy measures, it will be important to weigh the benefits and costs of unconventional measures, while taking account of the developments in economic activity and prices as well as financial conditions at that point in time.

In addition, unconventional monetary policy measures accompanied by balance sheet expansions have the potential to impact central bank finances in the phase of monetary tightening. Even if a central bank temporarily makes losses or has negative equity, this does not impede its ability to conduct monetary policy. However, if the central bank's financial risks become a matter of undue attention and give rise to unnecessary confusion over monetary policy, there is a risk that this could lead to a decline in its credibility. Therefore, ensuring the soundness of the central bank's finances is important.

B. Price Stability Target of 2 Percent

Given that unconventional monetary policy measures cannot fully substitute for conventional monetary policy measures (guiding short-term interest rates), it is desirable to conduct monetary policy so that the zero lower bound would not be reached. From this perspective, it is important to maintain a moderate positive inflation rate in a stable manner so that real interest rates can be lowered in the case of an economic downturn. The bias in the consumer price index (CPI) also continue to serve as a supporting evidence for central banks that they should aim for a positive inflation rate. These views are shared by central banks in major advanced economies, many of which have set their inflation targets at 2 percent. It is also widely recognized that, in conducting monetary policy, it is important not to focus on the inflation rate at each point in time, but rather to capture the underlying trend of inflation by analyzing a variety of factors affecting the price changes.

Considering the above, it is appropriate for the Bank to continue to conduct monetary policy from the perspective of sustainable and stable achievement of the price stability target of 2 percent.

The results of surveys for firms and households indicate that many preferred a situation in which both prices and wages (income) rise moderately to a situation in which they both remain almost unchanged. When Japan was under the prolonged deflation, or in a low-inflation environment, prices of many items became more rigid and the regular pay tended to be unchanged. Such a situation may have distorted

resource allocation or have constrained proactive investment by firms. Based on these experiences, it is necessary to achieve a moderate rise in prices accompanied by wage increases.

C. Fiscal and Monetary Policy

Both fiscal and monetary policies are important macroeconomic policy measures that have a significant impact on aggregate demand, and the transmission channels and effects of these policies interact with each other. In this regard, it has been pointed out that, when monetary policy is faced with the effective lower bound on nominal interest rates, a policy mix of fiscal and monetary policy tends to be more effective. On the other hand, in the exchange of views conducted as part of the Review, it was pointed out that the large-scale monetary easing implemented by the Bank led to a loosening of fiscal discipline. In order to ensure confidence in the currency and to achieve price stability, it is crucial for the Bank to continue to clearly explain as it has been doing continuously and consistently, that the aim of monetary policy is to achieve price stability and should not be to support monetary financing of government debt.

D. Issues regarding Individual Monetary Policy Measures

Based on the discussions in the Review, the Bank should not exclude at this point any specific measures when considering the future conduct of monetary policy. However, from the experience of conducting unconventional monetary policy including large-scale monetary easing, it has become increasingly clear that the effects of each measure entail uncertainties and that each measure has its own side effects and caveats. Looking ahead, in considering the implementation of unconventional monetary policy measures, it will be necessary for the Bank to design policy measures that can exert positive effects while minimizing side effects as much as possible, taking account of the findings of the Review.

The Background

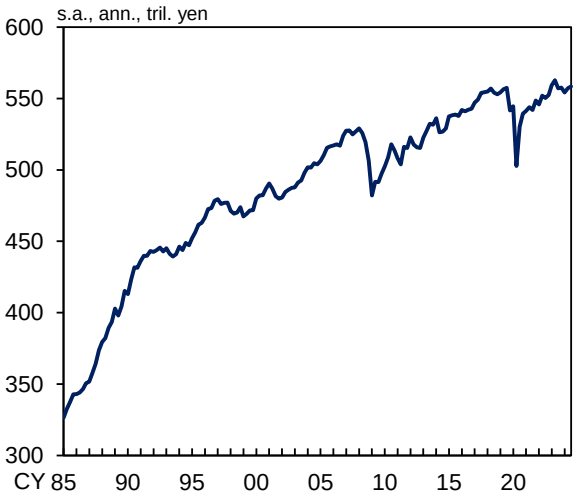
"The Background" provides explanations of "The Bank's View" in the Review. "The Bank's View" was decided by the Policy Board at the Monetary Policy Meeting held on December 18 and 19, 2024.

Motivation behind the Review

In Japan, achieving price stability has been a challenge for a long period of 25 years since the late 1990s, when the economy fell into deflation (Charts 1 and 2). During that period, the Bank implemented various monetary easing measures (Charts 3, 4, and 5). These measures have interacted with and influenced wide areas of Japan's economic activity, prices, and financial sector.

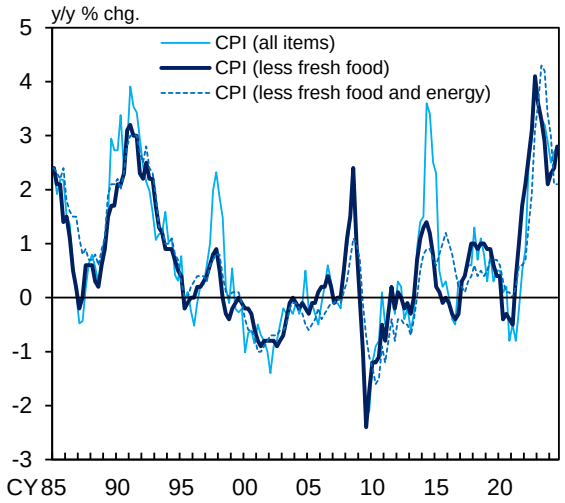
This report reviews developments in economic activity and prices as well as financial conditions in Japan over the past 25 years and assesses the effects of various unconventional monetary policy measures implemented during this period in the context of interactions with developments in economic activity and prices at each point in time. In addition, it analyzes the impact, including the side effects, on financial markets, the financial system, and other related areas. Finally, it considers the implications for the future conduct of monetary policy.[2]

Chart 1: Real GDP



Source: Cabinet Office.

Chart 2: Consumer Price Index (CPI)



Source: Ministry of Internal Affairs and Communications.
Note: Figures for the CPI (less fresh food) and the CPI (less fresh food and energy) are staff estimates and exclude mobile phone charges and the effects of consumption tax hikes, policies concerning the provision of free education, and travel subsidy programs.

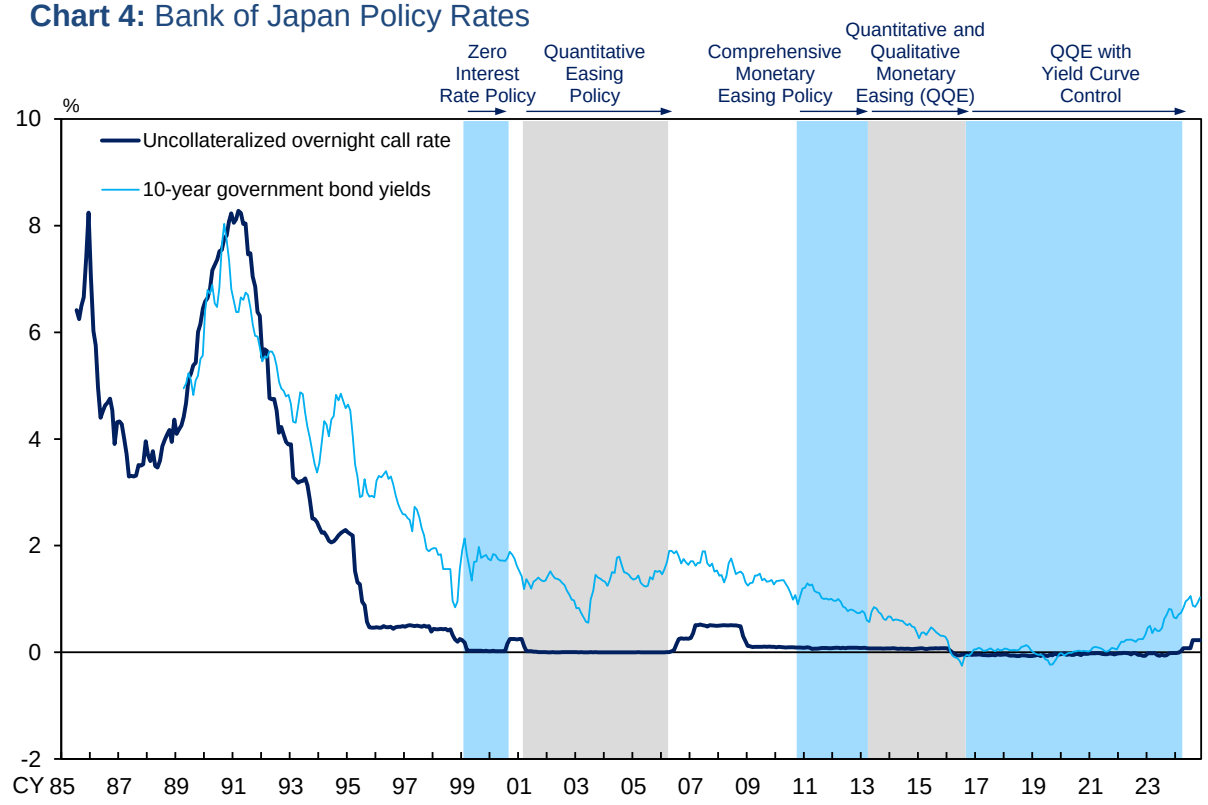
[2] In the course of conducting the Review, the Bank implemented various initiatives, including the exchange of opinions, in order to enhance objectivity and transparency through incorporating insights from a variety of sources. See Appendix 1 for specific details of these efforts as well as the opinions received.

Chart 3: Transition of the Bank of Japan's Monetary Policy

		Operating target	Target of short-term interest rates	(1) Lowering longer-term interest rates	(2) Affecting risk premiums	(3) Applying a negative interest rate to current accounts at the BOJ	(4) Encouraging inflation expectations to rise
Feb. 1999 – Aug. 2000	**Zero Interest Rate Policy**	Uncollateralized overnight call rate	**"As low as possible"** (virtually 0%)	**Policy duration effect** (forward guidance)			
Mar. 2001 – Mar. 2006	**Quantitative Easing Policy**	**Current account balances at BOJ**	Around 0%	**Policy duration effect** (forward guidance)			
Oct. 2010 – Apr. 2013	**Comprehensive Monetary Easing Policy**	Uncollateralized overnight call rate	**0 to 0.1%** (virtually 0%)	**JGB purchases / Fixed-rate funds-supplying operation** **Policy duration effect** (forward guidance)	**Purchases of risk assets** (CP, corporate bonds, ETFs, J-REITs)		"Price stability target of 2 percent" (since Jan. 2013)
Apr. 2013 –	**Quantitative and Qualitative Monetary Easing (QQE)**	**Monetary base**	Around 0% ↓ Negative territory (Jan. 2016-)	**Large-scale JGB purchases**	**Purchases of risk assets**	**Negative interest rate** (introduced in Jan. 2016)	**Strong and clear commitment to achieve the price stability target**
Sept. 2016 – Mar. 2024	**QQE with Yield Curve Control**	**Short- and long-term interest rates** ・Short-term policy interest rate ・10-yr JGB yields ・Forward guidance (July 2018)	Negative territory	**Yield curve control** (YCC)	**Purchases of risk assets**	**Negative interest rate**	**Added inflation-overshooting commitment**

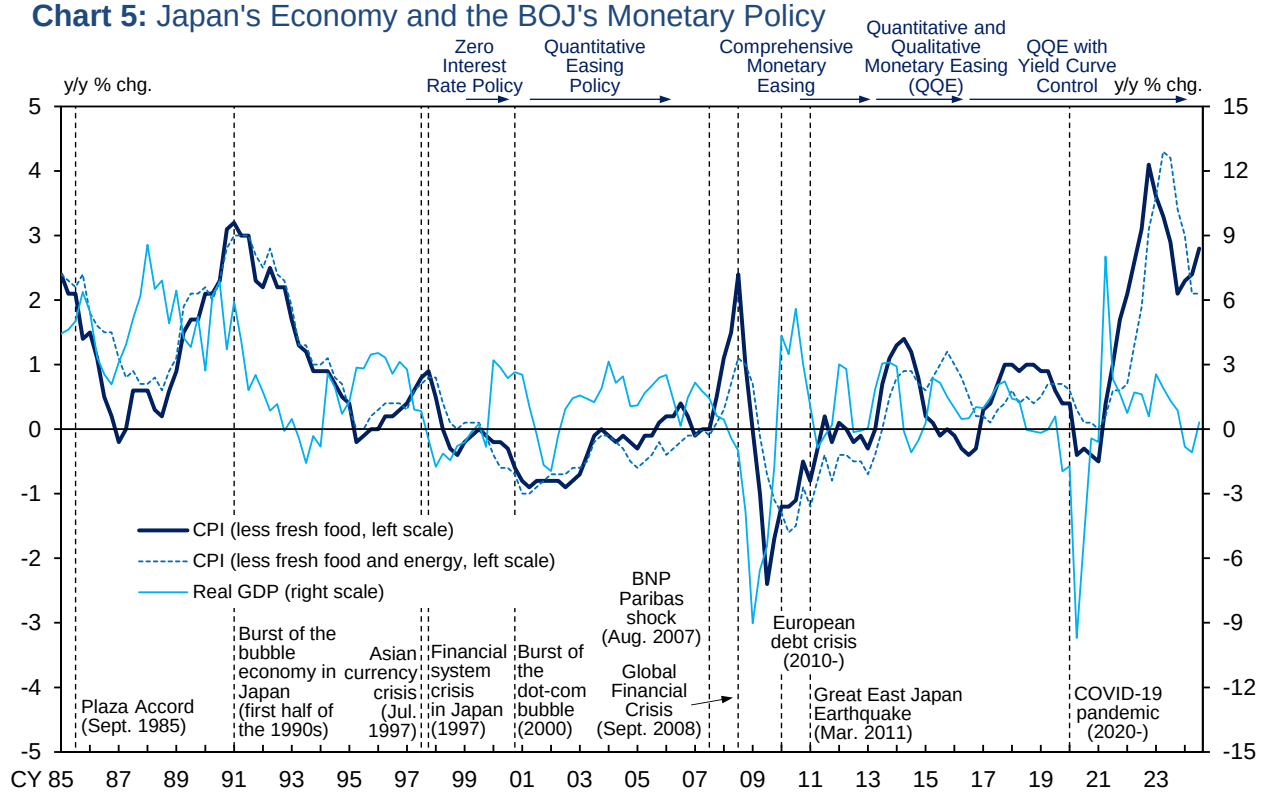
Source: Bank of Japan.

Chart 4: Bank of Japan Policy Rates



Sources: Bank of Japan; Bloomberg.

Chart 5: Japan's Economy and the BOJ's Monetary Policy



Sources: Ministry of Internal Affairs and Communications; Cabinet Office.
Note: The CPI figures are staff estimates and exclude mobile phone charges and the effects of consumption tax hikes, policies concerning the provision of free education, and travel subsidy programs.

I. Developments in Economic Activity, Prices, and Financial Conditions and the Conduct of Monetary Policy in Japan over the Past 25 Years

A. Developments in Economic Activity, Prices, and Financial Conditions in Japan since the Latter Half of the 1990s

Japan fell into deflation in the latter half of the 1990s, experiencing a sustained decline in prices (Chart 2). Although subsequently there were phases in which the rate of change in prices temporarily turned positive, Japan generally continued to experience moderate deflation until the early 2010s. The reasons for this prolonged period of moderate deflation can be broadly divided into three main points.

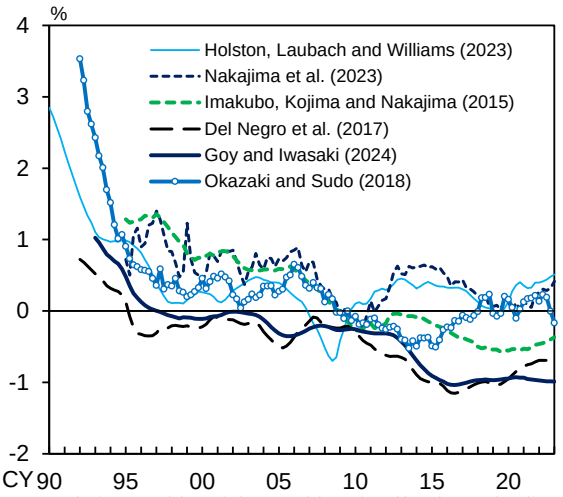
Background to Japan's Deflation (1): Decline in the Natural Rate of Interest and Chronic Shortage of Demand

The first point is that, (1) with the natural rate of interest, which is the real interest rate neutral to economic activity and prices, declining (Chart 1-1-1), (2) conventional monetary policy measures were unable to sufficiently stimulate the economy due to the effective lower bound on nominal short-term interest rates (Chart 1-1-2), (3) resulting in a chronic shortage of demand (Chart 1-1-3).

Estimates of the natural rate of interest have followed a long-term downward trend since the 1990s.[3] While several factors have contributed to this downward trend in the natural rate of interest, one of the most important factors is the bursting of the asset bubble in the early 1990s. That is, as asset prices fell sharply and growth expectations took a downward turn after the burst of the bubble, firms were forced to adjust their excess debt, excess capacity, and excess employment, and

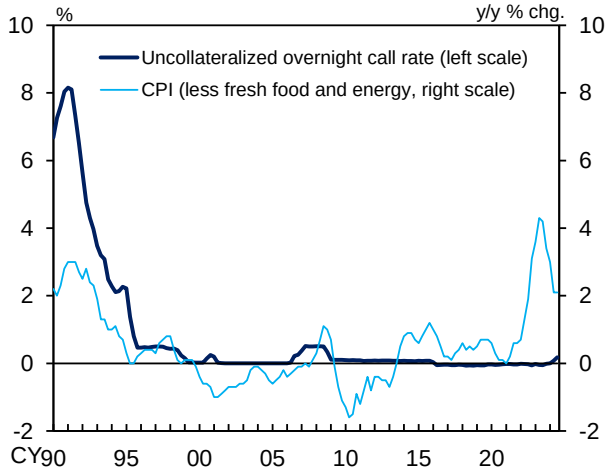
[3] For a discussion of the issues surrounding Japan's natural rate of interest, see Appendix 2.

Chart 1-1-1: Natural Rate of Interest



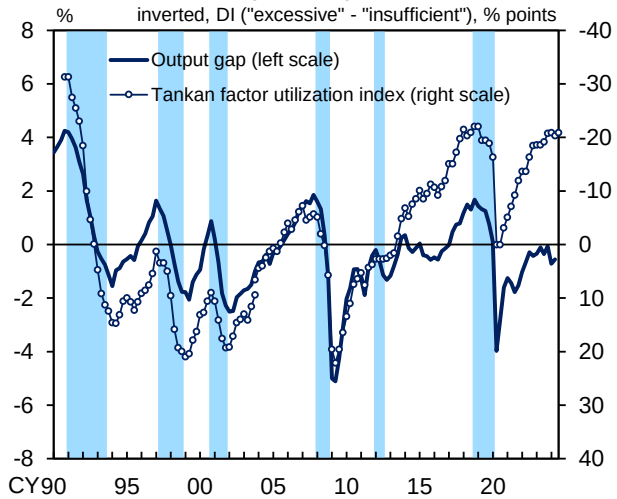
Sources: Bank of Japan; Ministry of Finance; Ministry of Health, Labour and Welfare; Cabinet Office; Ministry of Internal Affairs and Communications; Bloomberg; Consensus Economics Inc., "Consensus Forecasts."
Note: The estimates are based on staff calculations using the models proposed in the different papers.

Chart 1-1-2: Nominal Short-Term Rate and CPI



Sources: Bank of Japan; Ministry of Internal Affairs and Communications.
Note: The CPI figures are staff estimates and exclude mobile phone charges and the effects of consumption tax hikes, policies concerning the provision of free education, and travel subsidy programs.

Chart 1-1-3: Output Gap



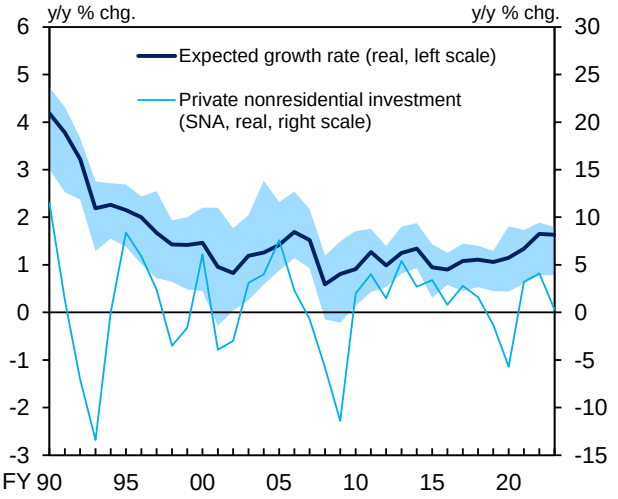
Source: Bank of Japan.
Notes: 1. Figures for the output gap are staff estimates.
2. The *Tankan* factor utilization index is calculated as the weighted average of the production capacity DI and the employment conditions DI. The capital and labor shares are used as weights. There is a discontinuity in the data for December 2003 due to a change in the survey framework.
3. Shaded areas denote recession periods.

became more cautious in their risk-taking (Charts 1-1-4, 1-1-5, and 1-1-6).

From the late 1990s to the early 2000s, the financial system became increasingly unstable as the non-performing loan problem worsened and the prices of assets held by financial institutions such as stocks fell. Many financial institutions at that time faced two constraints: capital constraints and liquidity constraints, and financial institutions' lending attitudes as perceived by firms tightened substantially. As the curbs on new loans and the forcible withdrawal of outstanding loans by banks became more intense, firms increasingly prioritized ensuring their financial soundness over making investments, and the net saving position of the corporate sector turned positive. As a result, productivity growth through the accumulation of capital, R&D investment, and human capital investment slowed substantially, leading to a downturn in the potential growth rate (Chart 1-1-7). This, combined with a stagnation of corporate demand for funds, pushed down the natural rate of interest. There was a cyclical increase in business fixed investment in the mid-2000s due to a combination of the easing of liquidity constraints as a result of the Bank's Quantitative Easing Policy, government measures to address financial institutions' capital constraints, and progress by firms and financial institutions in their balance sheet adjustments; subsequently, however, firms fundamentally remained cautious in their activities amid major negative shocks such as the Global Financial Crisis and the Great East Japan Earthquake.

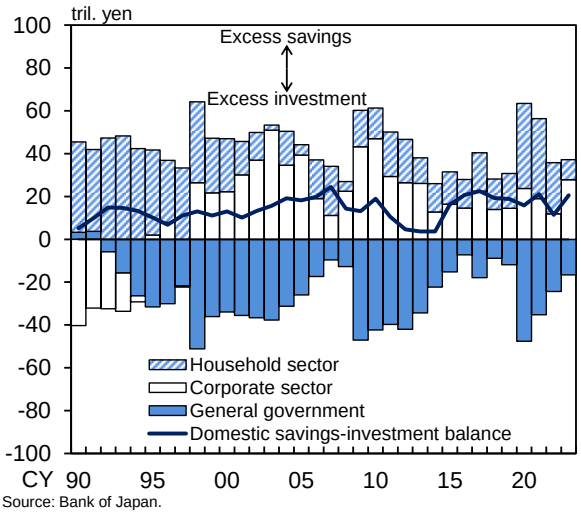
Meanwhile, it appears that globalization and demographic changes also contributed to pushing down the natural rate of interest (Chart 1-1-8). If Japan's economy and society had adapted more to the changes in circumstances since the 1990s

Chart 1-1-4: Expected Growth Rate



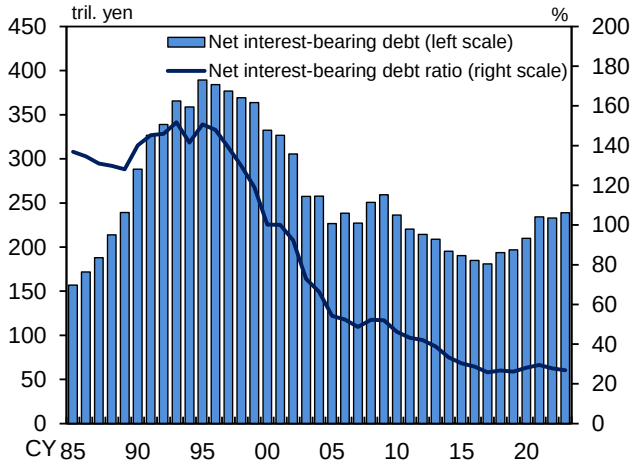
Source: Cabinet Office.
Note: The "expected growth rate" is the average of firms' forecasts of the real growth rate of industry demand over the next five years. The shaded area indicates the 20-80 percentile band of the expected growth rate.

Chart 1-1-5: Savings-Investment Balance



Source: Bank of Japan.

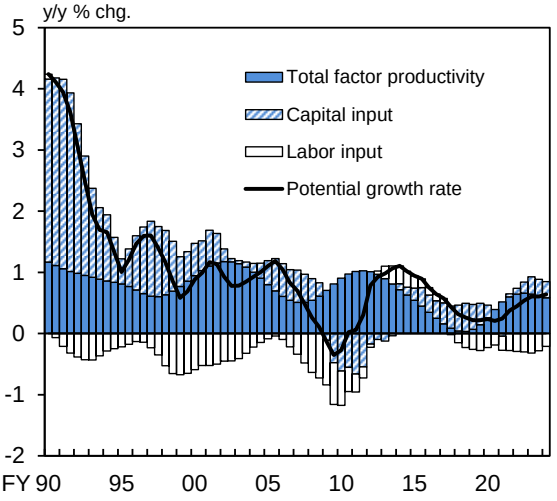
Chart 1-1-6: Corporate Balance Sheet Adjustments



Source: Ministry of Finance.
Note: Based on the *Financial Statements Statistics of Corporations by Industry, Quarterly*. Excluding finance and insurance. Year-end values. Net interest-bearing debt is the sum of borrowings from financial institutions (liquid liabilities and fixed liabilities) and bonds, less cash and deposits.
Net interest-bearing debt ratio = Net interest-bearing debt / Net assets

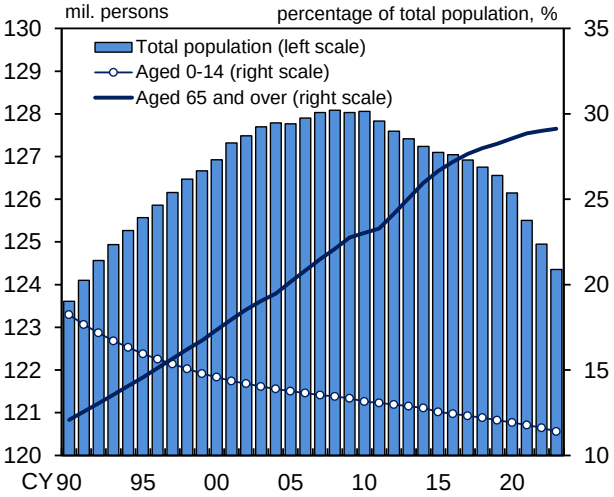
such as globalization and the rapid IT revolution, these changes would have had a positive effect on the economy through increases in efficiency and productivity and the capturing of overseas demand. However, in contrast to countries such as the United States, where the utilization of IT boosted productivity, and emerging economies, where economic catch-up continued to make rapid progress, Japan was slow to respond to these economic and social changes as it took time to make adjustments after the burst of the bubble. While production shifted overseas, not enough high-productivity industries emerged domestically, which contributed to the decline in the growth trend and sluggish domestic investment. Moreover, the declining birthrate and aging population may have pushed down the natural rate of interest, especially since the 2000s, as households started to save more in preparation for longer life expectancies and firms curbed investment for future domestic demand (Chart 1-1-9).

Chart 1-1-7: Potential Growth Rate



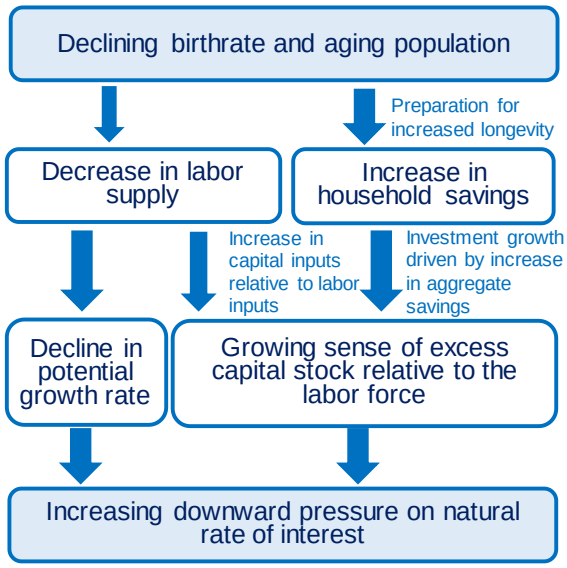
Source: Bank of Japan.
Note: Figures are staff estimates. Figures for the first half of fiscal 2024 are those for 2024/Q2.

Chart 1-1-8: Demographic Changes



Source: Ministry of Internal Affairs and Communications.

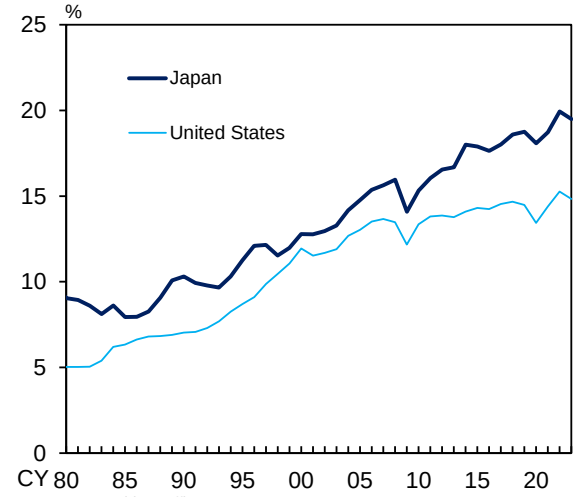
Chart 1-1-9: Overview of Relationship between Demographics and Natural Rate of Interest



Background to Japan's Deflation (2): Increasing Downward Pressure on Prices from the Supply Side

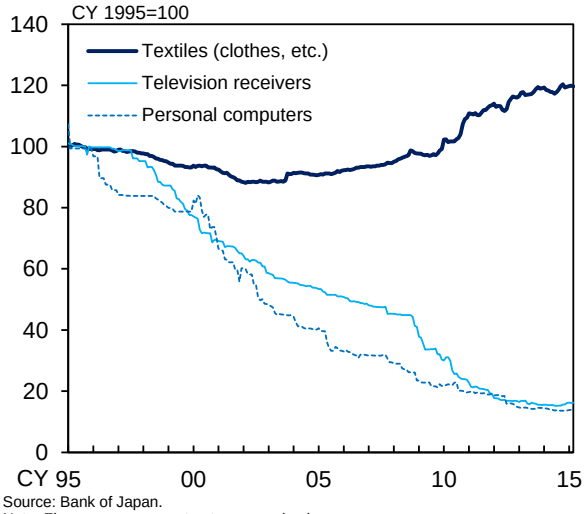
The second point is that from the mid-1990s to the 2000s, factors such as intensifying price competition with imports from emerging economies due to globalization and the global spread of technological innovations in industries such as IT-related ones also acted to push prices downward (Charts 1-1-10 and 1-1-11). [4] Specifically, up until the mid-1990s, amid the continuing appreciation of the yen and shift of production overseas, deregulation and the streamlining of distribution structures based on considerations of the differential between overseas and domestic prices as well as the global spread of technological innovations in industries such as IT-related ones pushed down prices from the supply side (Chart 1-1-12). Moreover, the appreciation of the yen against other currencies in the period following the Global Financial Crisis in the late 2000s also exerted downward pressure on prices.

Chart 1-1-10: Import Penetration Rate



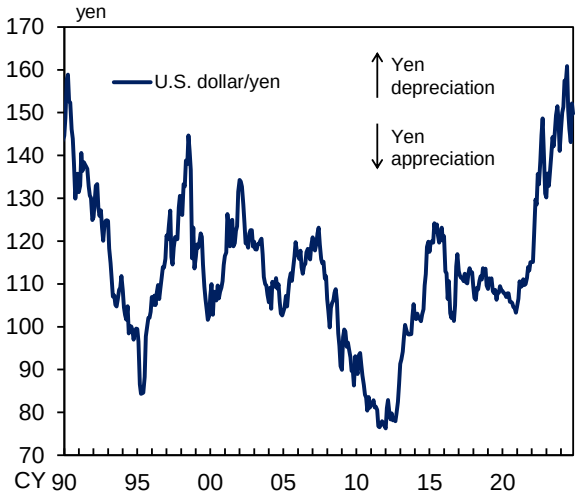
Sources: BEA; Cabinet Office.
Note: Import penetration rate = Imports / (GDP + Imports - Exports)

Chart 1-1-11: Import Prices



Source: Bank of Japan.
Note: Figures are on a contract currency basis.

Chart 1-1-12: Exchange Rate



Source: Bloomberg.
Note: End-of-month values.

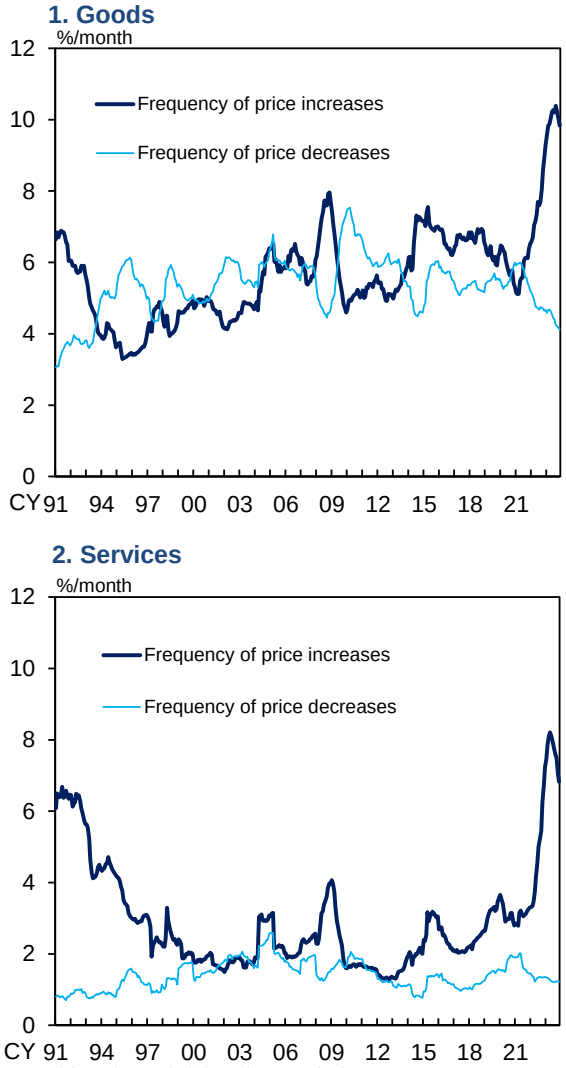
[4] For a discussion of the impact of globalization on prices in Japan through various channels, see Appendix 3.

Background to Japan's Deflation (3): Entrenchment of Behavior and a Mindset Based on the Assumption That Wages and Prices Will Not Increase Easily

The third point is that the prolonged moderate deflation caused by the sluggish demand and the changes in the competitive environment described above led to the gradual entrenchment of behavior and a mindset based on the assumption that wages and prices will not increase easily.

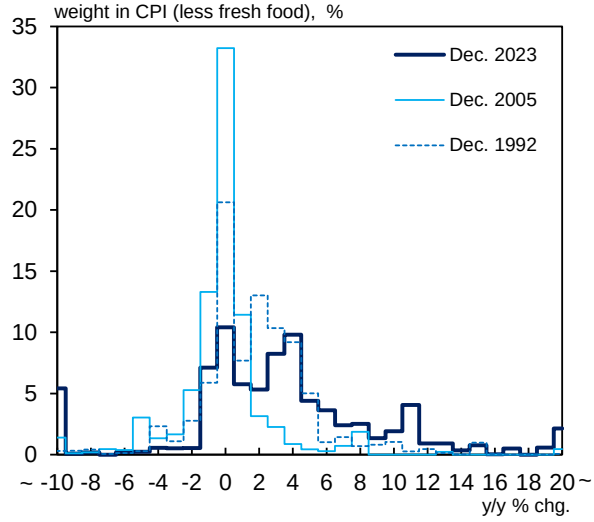
That is, the chronic shortage of demand during the adjustment process after the burst of the bubble, coupled with increased competition from abroad, led to an intensification of price competition among firms. Under these circumstances, many firms increasingly refrained from passing on costs to customers, even as input costs rose. The frequency of price revisions by firms declined, particularly in the service sector, and the number of items for which the rate of price increase was around zero percent increased substantially (Charts 1-1-13 and 1-1-14). As such patterns spread, firms became more inclined to keep prices unchanged for fear of losing customers even if costs rose, and prioritized cost cutting in their business strategies (Chart 1-1-15). The practice of revising prices gradually disappeared as many firms adopted this kind of strategy and customers came to take it for granted. The need to correct the price differential between domestic and overseas markets and ensure price competitiveness amid the strong yen in the mid-1990s may also have played a role in the shift in firms' behavior (Charts 1-1-16, 1-1-17, and 1-1-18). Quantitative analyses also show that for firms the costs associated with price revisions, especially upward revisions, have increased.[5]

Chart 1-1-13: Frequency of Price Revision



Source: Ministry of Internal Affairs and Communications.
Note: The charts show the shares of cities that observed a monthly change in the average price of items in the *Retail Price Survey*, excluding fresh food, electricity, gas, water, and rent. Figures exclude temporary fluctuations reflecting factors such as consumption tax hikes and sales. Figures are converted into 12-month backward moving averages.

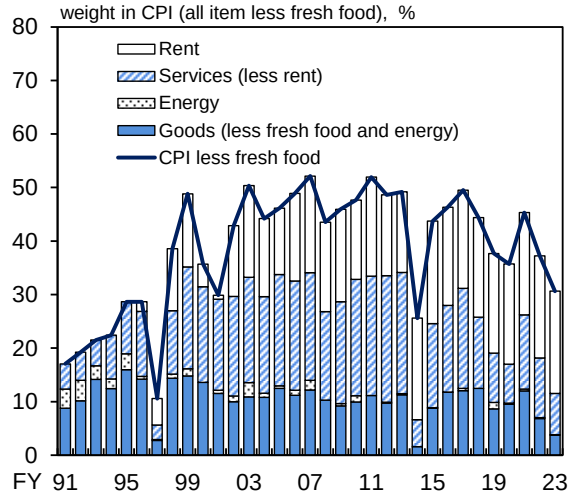
Chart 1-1-14: Distribution of Price Changes



Source: Ministry of Internal Affairs and Communications.
Note: Figures are for items in the CPI for all items less fresh food and rent.

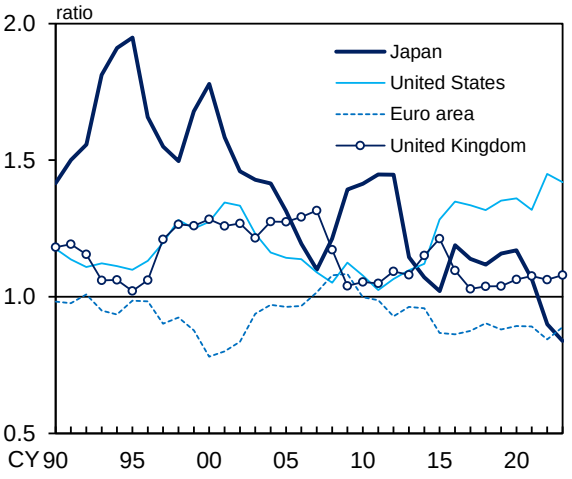
[5] In economics, the costs firms incur when revising prices are called "menu costs." For a quantitative analysis of menu

Chart 1-1-15: Share of Zero-Inflation Items



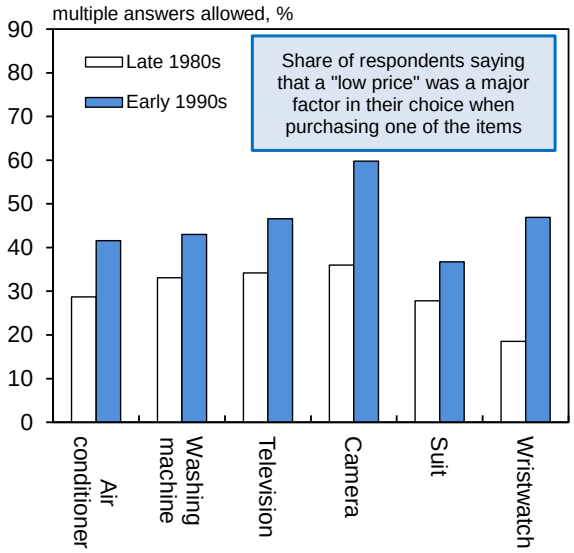
Source: Ministry of Internal Affairs and Communications.
Note: Zero-inflation items are defined as items whose annual rate of price change fall within a range of ±0.5%.

Chart 1-1-16: International Price Differentials (Major Advanced Economies)



Sources: BIS; IMF.
Note: Figures are calculated as PPP effective exchange rates / nominal effective exchange rates. PPP effective exchange rates are calculated as the geometric weighted averages of bilateral PPP exchange rates using the weights employed in the calculation of effective exchange rates.

Chart 1-1-17: Consumers' Increased Preference for Low-Priced Products



Source: Economic Planning Agency.
Note: Based on the results of the *Commodity Price Monitor Survey* conducted by the Economic Planning Agency in December 1992. Consumers were asked what determined their choice when purchasing one of the items listed within the last year, denoted by "Early 1990s" in the chart, and five or more years ago, denoted by "Late 1980s."

Chart 1-1-18: Main Topics in the *Price Report*

1. Reasons for Decline in Inflation Rate

	Global Factors, etc.	Domestic Factors
1995	・Yen appreciation ・International price differentials	・Progress in "price destruction" (Increased market share of discount outlets)
1996	・Intensified international competition and rising import penetration ・International price differentials	・Efforts to lower prices (Expansion of private-label products, etc.) ・Structural changes in the distribution system as a result of deregulation (Amendment of the Large-Scale Retail Stores Law, etc.)

2. Reasons for Consumers' Increased Preference for Low-Priced Products

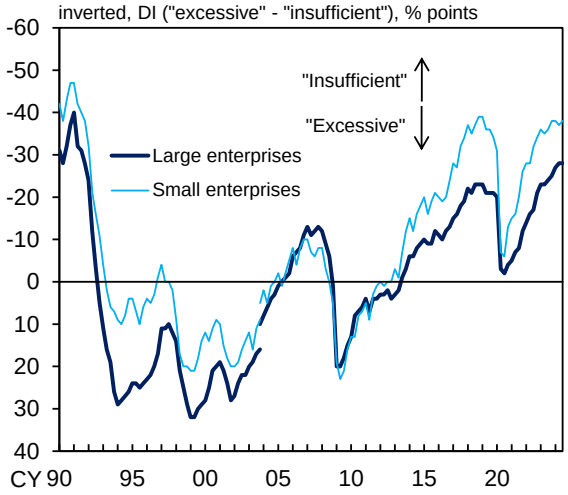
1995	"Consumers are becoming more price-sensitive due to factors such as the long-standing sluggish income growth, and there is widespread consumer behavior toward purchasing less expensive products."

Source: Economic Planning Agency, *Price Report*.

costs, see Appendix 4.

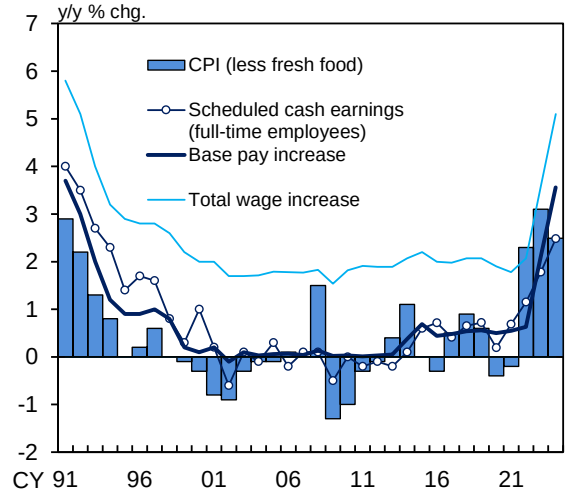
Intensifying price competition, coupled with a long-standing sense of excess employment since the early 1990s, acted to suppress wages as well (Charts 1-1-19 and 1-1-20). In particular, from the late 1990s to the early 2000s, as the profit environment deteriorated in the wake of the instability in Japan's financial system and the bursting of the global IT bubble, the pressure to restrain labor costs intensified further and major firms implemented large-scale business restructuring measures, including workforce reductions. Against this backdrop, society as a whole, including workers, increasingly prioritized employment stability over wage increases (Chart 1-1-21). Moreover, there were also widespread moves by firms to keep total personnel costs flexible by increasing the number of non-regular employees (Chart 1-1-22). The suppression of wages associated with these efforts also made prices less likely to rise from a cost perspective (Chart 1-1-23).

Chart 1-1-19: Employment Conditions



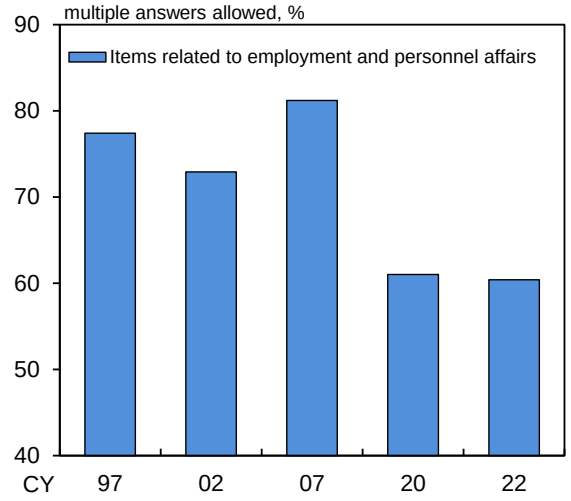
Source: Bank of Japan.
Note: Based on the *Tankan*. All industries. There is a discontinuity in the data for December 2003 due to a change in the survey framework.

Chart 1-1-20: Wages and Prices



Sources: Ministry of Health, Labour and Welfare; Ministry of Internal Affairs and Communications; Japanese Trade Union Confederation (Rengo); Central Labour Relations Commission.
Notes: 1. The CPI figures exclude the effects of consumption tax hikes, etc. The figure for 2024 is the January-October average.
2. Figures for scheduled cash earnings before 1994 are those for regular employees. Moreover, figures from 2016 onward are based on continuing observations following sample revisions. The figure for 2024 is the January-September average.
3. Figures for base pay and total wage increases from 1991 to 2013 are those published by the Central Labour Relations Commission, while those from 2014 to 2024 are figures released by Rengo.

Chart 1-1-21: Items Negotiated in the Collective Bargaining



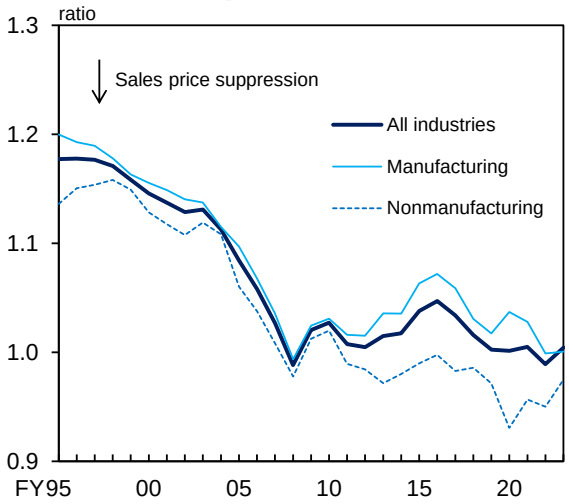
Source: Ministry of Health, Labour and Welfare.
Notes: 1. Figures from 1997 to 2007 are from the *Survey on Collective Bargaining and Labour Disputes*, while those from 2020 to 2022 are from the *Survey on Status of Collective Bargaining and Agreements*.
2. Items related to employment and personnel affairs include those regarding recruitment plans, employment retention, and dismissals.

Chart 1-1-22: Share of Non-Regular Employees

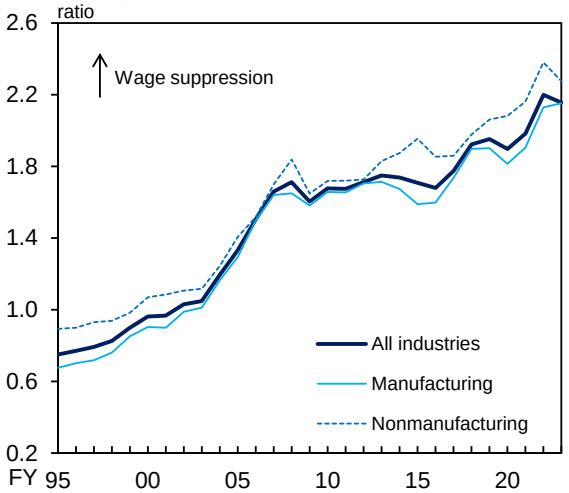
Source: Ministry of Internal Affairs and Communications.
Note: Figures prior to 2013 are based on the "detailed tabulation" in the *Labour Force Survey*. Those from 2013 onward are based on the "basic tabulation." The figure for 2024 is the January-October average.

Chart 1-1-23: Price Markups and Wage Markdowns

1. Price Markups



2. Wage Markdowns

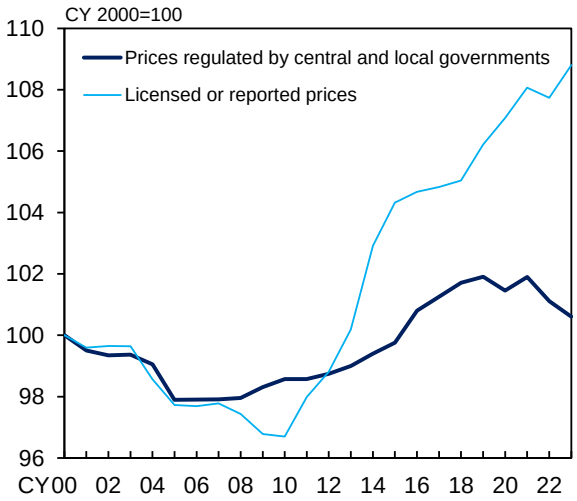


Sources: Research Institute of Economy, Trade and Industry; Ministry of Finance; Cabinet Office; Development Bank of Japan, "Corporate Financial Databank"; Aoki et al. (2024).
Note: Price markups are the ratio of sales price to marginal cost. Wage markdowns are the ratio of marginal revenue product of labor to wages. Figures for fiscal 2023 are April-December averages.

The behavior and mindset based on the assumption that wages and prices will not increase easily also came to be incorporated into various social institutions. For example, administered prices, especially for items in which the government is heavily involved in price revisions, became extremely unlikely to increase and there were moves to absorb cost increases through subsidies rather than price increases (Charts 1-1-24, 1-1-25, and 1-1-26).[6]

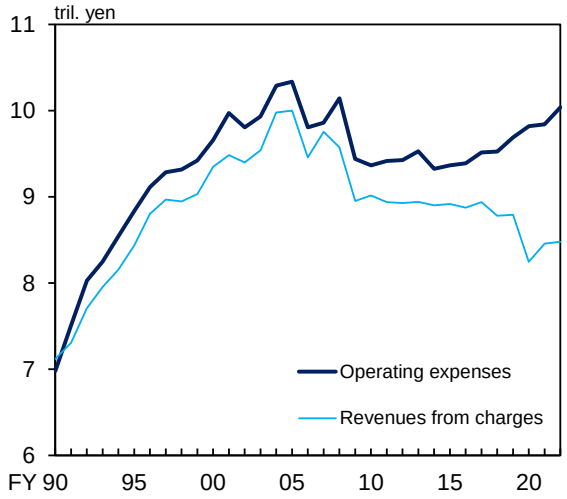
Under these circumstances, medium- to long-term inflation expectations were also unstable at low levels (Chart 1-1-27).[7] Medium- to long-term inflation expectations in Japan, unlike those in the United States and Europe, are not anchored at the central bank's inflation target and have been formed in an adaptive manner in the sense that they are susceptible to past price fluctuations. In addition to actual inflation, medium- to long-term inflation expectations also remained low, leading to a situation where prices became even less likely to increase. The wage and price-setting behavior of firms over the past 25 years outlined here is also evident in a large-scale corporate survey (*Survey regarding Corporate Behavior since the Mid-1990s*) conducted as part of the Review (Chart 1-1-28).[8]

Chart 1-1-24: Administered Prices since the 2000s



Source: Ministry of Internal Affairs and Communications.
Note: Prices are classified based on the Economic Planning Agency's *Price Report* and Shintani et al. (2016). Figures exclude energy and the effects of consumption tax hikes, policies concerning the provision of free education, and revisions of the healthcare insurance system.

Chart 1-1-25: Profit Structure of Local Public Enterprises



Source: Ministry of Internal Affairs and Communications.
Note: Figures exclude public enterprises classified as local incorporated administrative agencies and the effects of changes in accounting standards in fiscal 2014.

[6] For details, see Shintani et al. (2016).

Shintani, Kohei, Yoshiyuki Kurachi, Shinichi Nishioka, and Takashi Okamoto (2016), "Administered Prices in Japan: Institutional Comparisons with Europe and the United States," Bank of Japan Review Series, No. 2016-E-9.

[7] There are various measures of inflation expectations, and their characteristics must be taken into account when assessing them. In Chart 1-1-27(1), measures for households', firms', and experts' inflation expectations are synthesized and evaluated based on certain assumptions. For details, see Osada and Nakazawa (2024).

Osada, Mitsuhiro and Takashi Nakazawa (2024), "Assessing Measures of Inflation Expectations: A Term Structure and Forecasting Power Perspective," Bank of Japan Review Series, No. 2024-E-4.

[8] For details on firms' wage and price-setting behavior over

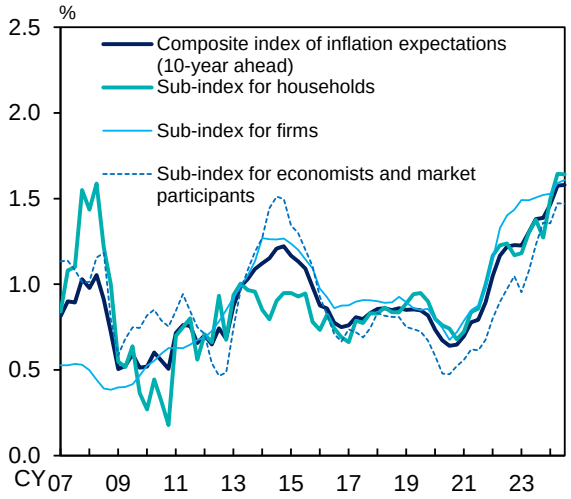
Chart 1-1-26: Developments regarding Administered Prices through the 1990s

Oct. 1989	Economic Planning Agency highlighted international price differentials in administered prices in its *Price Report*.
Dec.	"On the promotion of measures against international price differentials" (Agreement at the government/ruling party's headquarters for the promotion of measures against international price differentials) ➢ Regarding administered prices, the government will realize reasonable prices by further improving productivity while examining the cost structure from an international perspective.
Apr. 1994	"On the basic stance on the treatment of administered prices" (Agreement at the ministerial meeting on price issues) ➢ Administered prices will be treated in a strict manner, giving due consideration to the impact on general prices and people's lives. Price increases should be made only when they are truly unavoidable, on the condition that the management of public enterprises will be made thoroughly efficient, and careless price increases should be strictly refrained from. In addition, factors such as the timing and extent of increases should be considered with the utmost care.
May	"On the temporary measures regarding the treatment of administered prices" (Document approved by the Cabinet) ➢ The document is often referred to as "the measures to suspend price hikes in the year."
Nov.	"On the future treatment of administered prices" (Document approved by the cabinet)
Mar. 1995	"On the plan for the promotion of regulatory reform" (Cabinet decision) ➢ Regarding the administered price system for private businesses, the government will promote the revision of pricing system and the realization of more diversified and flexible prices in light of the "On the future treatment of administered prices," in order to ensure high-quality services with lower costs. It will be accompanied by considerations on the characteristics of those businesses, the development of a competitive environment, and the promotion of business efficiency.
Mar. 1996	The basic issues study group of the special subcommittee of the price stability policy council published "On the way administered price setting should be, etc."
Mar. 1997	The basic issues study group of the special subcommittee of the price stability policy council published "Recommendations for administered price reform."

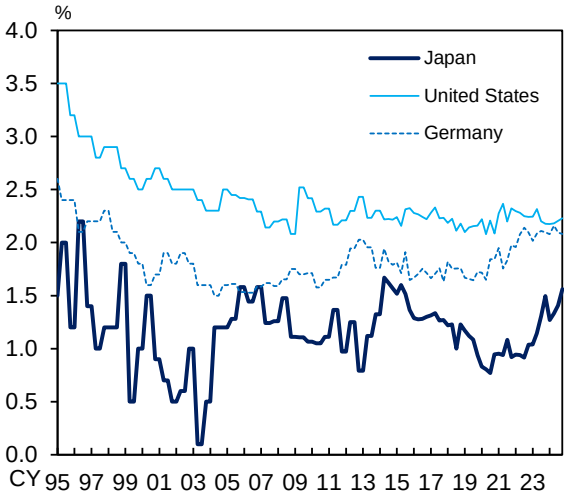
the past 25 years based on the corporate survey, see Appendix 5.

Chart 1-1-27: Inflation Expectations

1. Composite Index of Inflation Expectations



2. Inflation Expectations (Comparison of Major Countries)

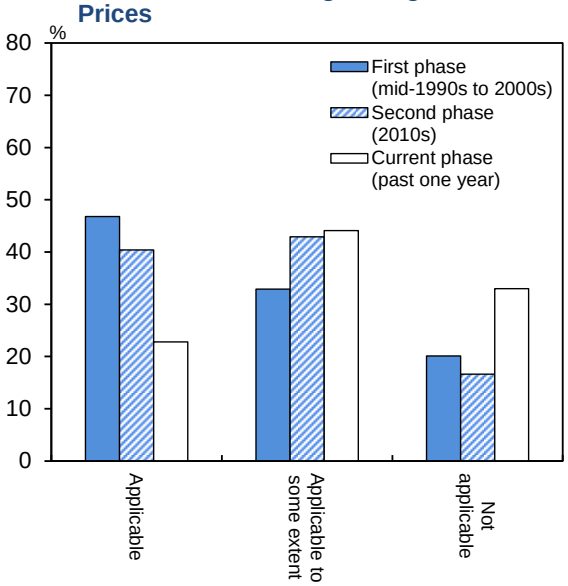


Sources: Bank of Japan; QUICK, "QUICK Monthly Market Survey <Bonds>"; Consensus Economics Inc., "Consensus Forecasts"; Bloomberg.

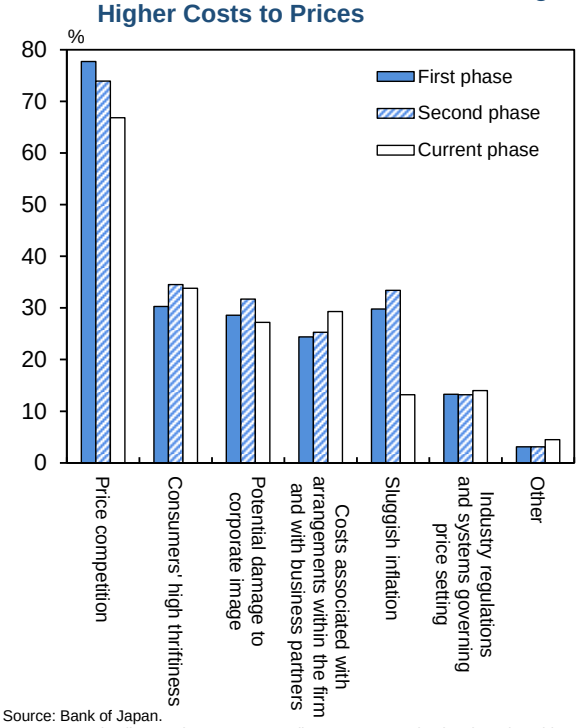
Note: Figures for the composite index of inflation expectations are based on the first principal component extracted from the following six indicators: two indicators for households from the *Opinion Survey on the General Public's Views and Behavior* (for qualitative and quantitative questions), one indicator for firms from the *Tankan*, and three indicators for economists and market participants from the QUICK Survey, the Consensus Forecasts, and data based on inflation swap rates. Data for firms before 2014 are obtained from Nakajima (2023). Figures for panel 2 are the expectations for the CPI 6 to 10 years ahead and are based on the "Consensus Forecasts."

Chart 1-1-28: Price Setting Behavior as Observed in a Corporate Survey

1. Difficulties in Passing on Higher Costs to Prices



2. Reasons for the Difficulties in Passing on Higher Costs to Prices



Source: Bank of Japan.

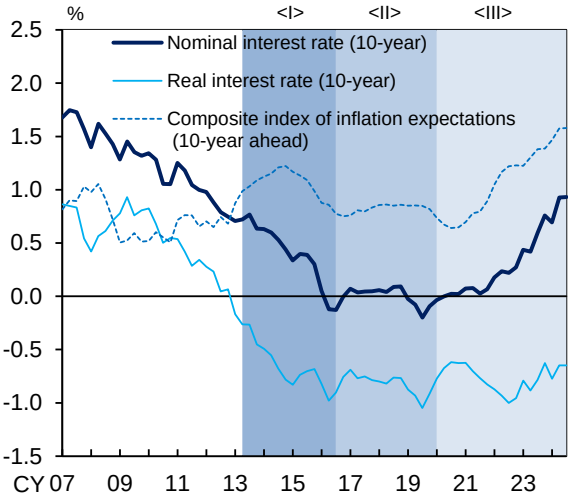
Notes: 1. For details, see the *Survey regarding Corporate Behavior since the Mid-1990s*.
2. In the second chart, figures are shares of firms that responded "applicable" or "applicable to some extent" in the first chart. Up to three reasons were allowed.

Changes since 2013: Transition to a Situation without Deflation

In 2013, the Bank set a price stability target of 2 percent and introduced a large-scale monetary easing program called "Quantitative and Qualitative Monetary Easing" (QQE) (Charts 1-1-29 to 1-1-37). The government also implemented various measures, including large-scale fiscal stimulus packages. During this period, following its appreciation in the wake of the Global Financial Crisis, there was a correction of the strong yen, partly due to changes in conditions abroad. Corporate profits recovered, especially among large firms, and stock prices rose. Under these circumstances, the chronic shortage of demand that had persisted for a long time began to abate, and with inflation expectations rising somewhat, the rate of change in the consumer price index (CPI) remained positive, so that Japan was no longer in deflation in the sense of a sustained decline in prices.

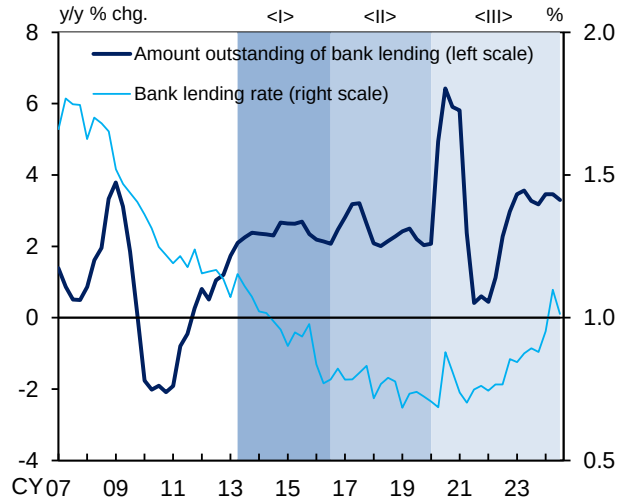
However, inflation in the 2010s remained below the price stability target of 2 percent. With firms remaining cautious, this was mainly due to the following factors: (1) there remained room for increases in the potential labor supply, such as from women and seniors, and supply did increase elastically in response to the tightening of labor market conditions, so that there was no substantial rise in upward pressure on wages and prices; and (2) with the rate of increase in actual wages and prices being limited, it took time for the behavior and mindset based on the assumption that wages and prices will not increase easily to change.

Chart 1-1-29: Interest Rate and Inflation Expectations



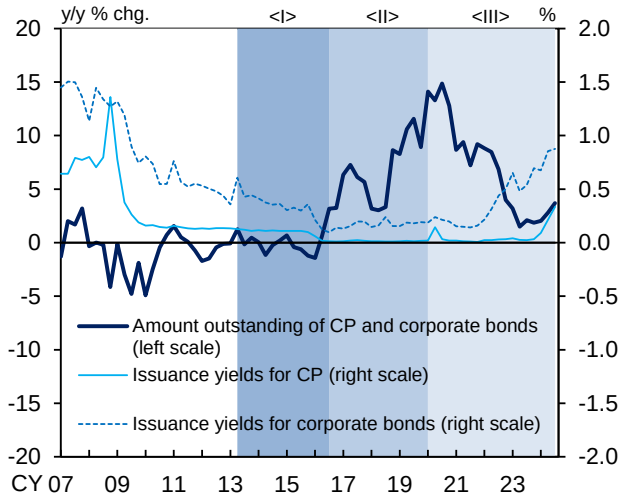
Sources: Bank of Japan; QUICK, "QUICK Monthly Market Survey <Bonds>"; Consensus Economics Inc., "Consensus Forecasts"; Bloomberg.
Notes: 1. Shaded area <I> denotes the period since the introduction of QQE (2013/Q2), <II> denotes the period since the introduction of QQE with Yield Curve Control (2016/Q3), and <III> denotes the period since the outbreak of COVID-19 (2020/Q1). The same applies to the following charts.
2. Figures for the real interest rate are calculated as government bond yields (10-year) minus the composite index of inflation expectations.
3. As for the composite index of inflation expectations, see the note for Chart 1-1-27.

Chart 1-1-30: Bank Lending



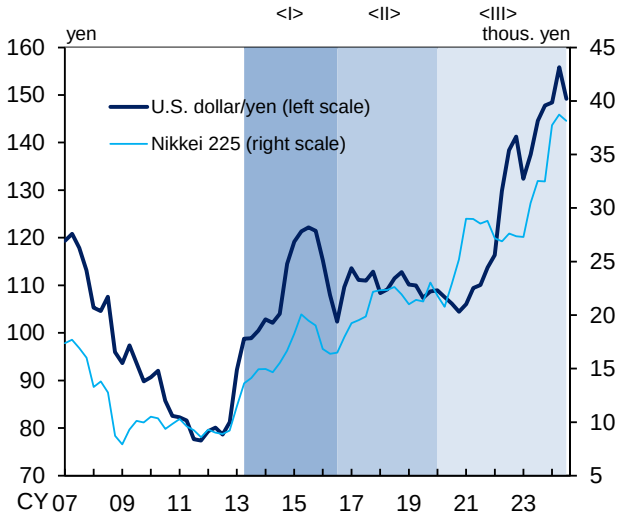
Source: Bank of Japan.
Note: Figures for the amount outstanding of bank lending are monthly averages. Lending by domestic commercial banks includes loans to firms, individuals, and local governments. Figures for the bank lending rate are the average contract interest rate on new long-term loans by domestically licensed banks.

Chart 1-1-31: Issuance of CP and Corporate Bonds



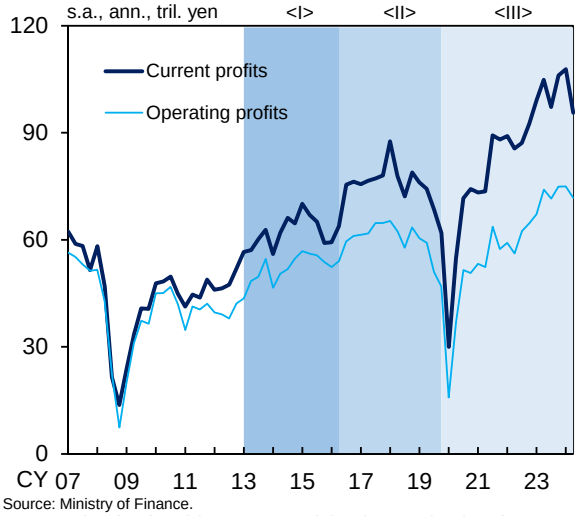
Sources: Japan Securities Depository Center; Japan Securities Dealers Association; Capital Eye; I-N Information Systems.
Note: Figures for CP and corporate bonds are those at the end of the period. Figures for issuance yields for CP up through September 2009 are the averages for CP (3-month, rated a-1 or higher). Those from October 2009 onward are the averages for CP (3-month, rated a-1). Figures for issuance yields for corporate bonds are the averages for domestically issued bonds launched on a particular date (rated AA). Bonds issued by banks and securities companies, etc. are excluded.

Chart 1-1-32: Foreign Exchange Rate and Stock Prices



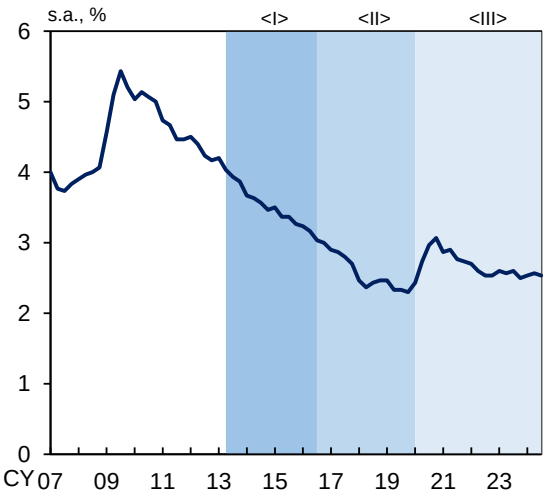
Source: Bloomberg.

Chart 1-1-33: Corporate Profits



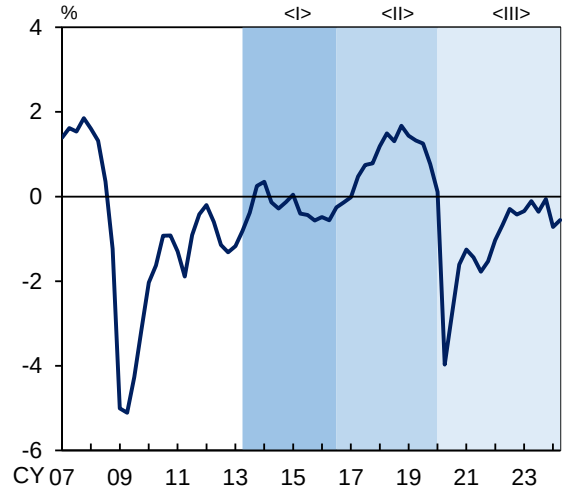
Source: Ministry of Finance.
Note: Based on the *Financial Statements Statistics of Corporations by Industry, Quarterly*. Excluding "finance and insurance." Figures from 2009/Q2 onward exclude pure holding companies.

Chart 1-1-34: Unemployment Rate



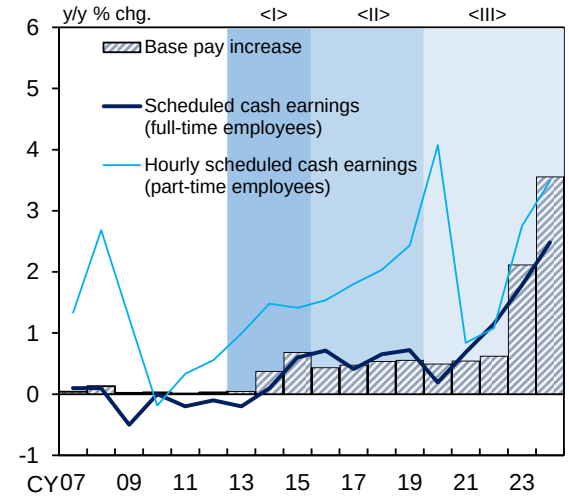
Source: Ministry of Internal Affairs and Communications.

Chart 1-1-35: Output Gap



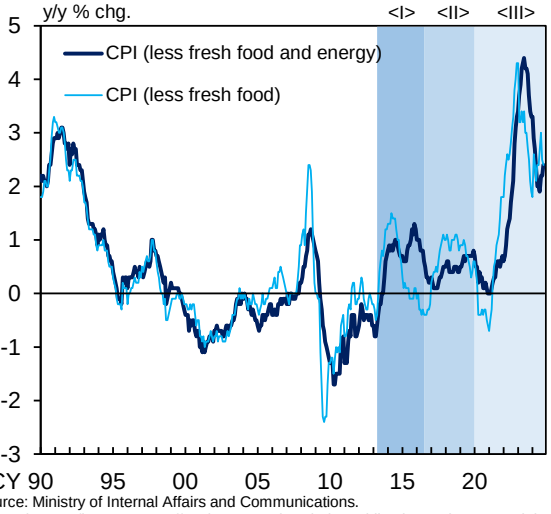
Source: Bank of Japan.

Chart 1-1-36: Wages



Sources: Ministry of Health, Labour and Welfare; Japanese Trade Union Confederation (Rengo); Central Labour Relations Commission.
Notes: 1. Figures for base pay increases prior to 2014 are those published by the Central Labour Relations Commission, while those from 2014 to 2024 are figures released by Rengo.
2. Figures for scheduled cash earnings from 2016 onward are based on continuing observations following sample revisions. Figures for 2024 are the January-September averages.

Chart 1-1-37: CPI



Source: Ministry of Internal Affairs and Communications.
Note: The CPI figures are staff estimates and exclude mobile phone charges and the effects of consumption tax hikes, policies concerning the provision of free education, and travel subsidy programs.

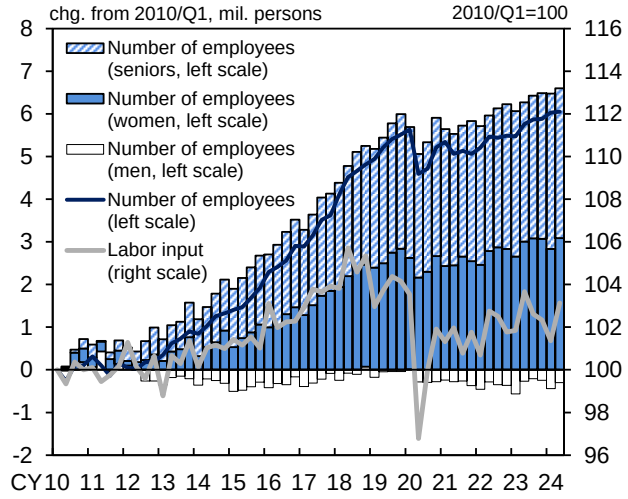
Changes in the 2020s

This situation has been changing in the 2020s.

First, in the labor market, the room for additional labor supply, including from women and seniors, appears to be shrinking (Chart 1-1-38). That is, the labor force participation rate of women, which rose substantially in the 2010s, is now near or above that of other major advanced economies (Chart 1-1-39). Although a large share of female workers in Japan work as non-regular employees and there is room to increase working hours per person, the growth in labor input as a whole is expected to slow. As for seniors, the pace of increase in labor participation is also slowing due to demographic changes, such as the Baby Boomer generation – i.e., those born in the late 1940s – reaching the age of 75 (Chart 1-1-40). Given these supply-side changes, and with the number of employed persons having already increased due to the prolonged monetary easing and other factors, labor shortages are becoming more pronounced (Chart 1-1-41).

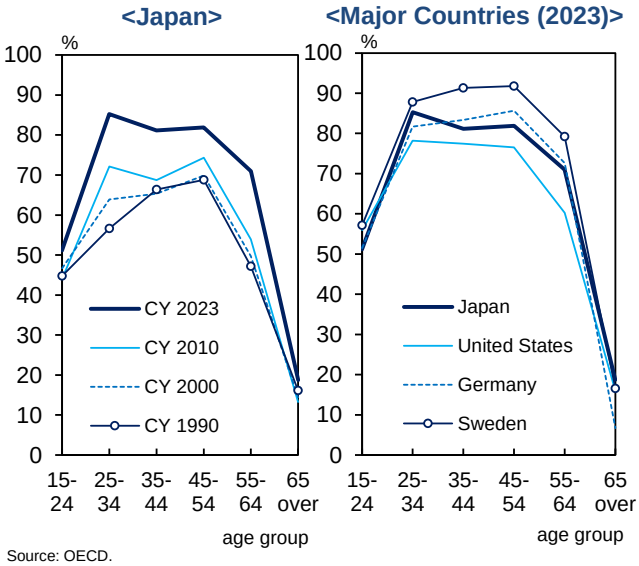
Second, firms' behavior has shifted more toward raising wages and prices, which suggests a change in the behavior and mindset based on the assumption that wages and prices will not increase easily. Japan's import prices rose sharply as a result of the global rise in inflation triggered by the COVID-19 pandemic and Russia's invasion of Ukraine as well as the depreciation of the yen reflecting the rapid interest rate hikes by central banks in the U.S. and Europe (Chart 1-1-42). With costs rising substantially and domestic demand continuing its gradual recovery, firms increasingly passed on higher input prices to their selling prices. Amid changing behavior and a changing mindset, it is likely becoming easier for firms to revise prices. As for wages, there have been changes in firms' wage-setting behavior and in their stance of

Chart 1-1-38: Labor Input



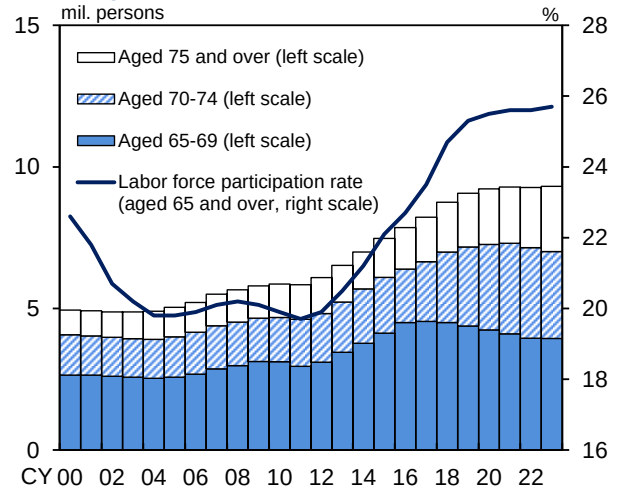
Sources: Ministry of Health, Labour and Welfare; Ministry of Internal Affairs and Communications.
Notes: 1. Figures are seasonally adjusted.
2. Figures for women and men are for employees aged between 15 and 64, while those for seniors are for employees aged 65 and over.
3. Labor input = Total hours worked (*Monthly Labour Survey*) × Number of employees (*Labour Force Survey*)

Chart 1-1-39: Labor Force Participation Rates of Women



Source: OECD.

Chart 1-1-40: Labor Force Participation among Seniors



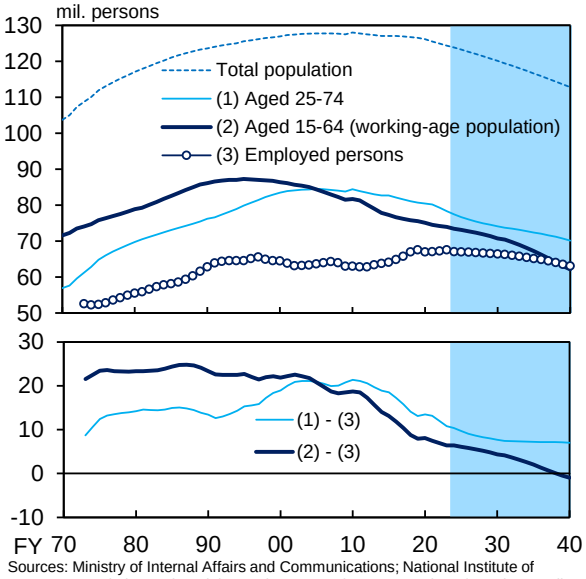
Source: Ministry of Internal Affairs and Communications.

prioritizing job security for workers amid the growing labor shortages due to the structural changes just described. Structural changes in the labor market, such as the growing market for job changers, have also been working in the direction of encouraging wage increases. Meanwhile, the government provided strong support for appropriate wage and price increases by measures such as the establishment of guidelines for appropriately passing on increases in raw material, labor, and other costs to selling prices, as well as targets for minimum wage increases. Taken together, these developments have strengthened moves to reflect general price increases in wage setting, so that in 2023 the rate of wage increases in spring labor-management wage negotiations reached the highest level in three decades, followed by a further increase in 2024 (Chart 1-1-20).

With these changes underway, households' and firms' medium- to long-term inflation expectations are also rising toward 2 percent.

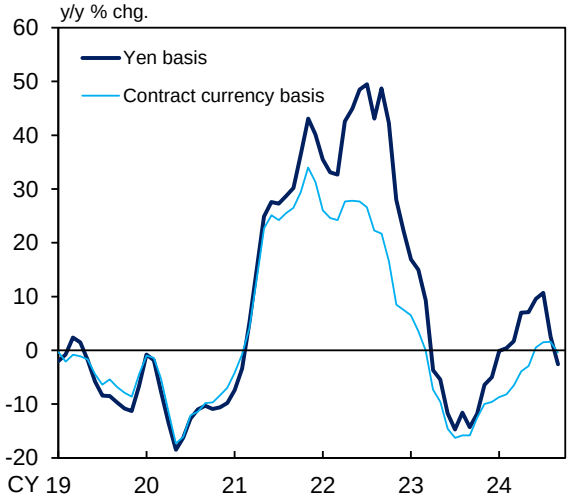
Meanwhile, the long-standing global disinflationary trend since the mid-1990s appears to be changing. While globalization had been pushing down prices worldwide, including in Japan, there is a view that this trend is changing against the backdrop of factors such as heightened geopolitical risks. Moreover, in the longer term, there is a risk that global warming will have an impact on prices of grains and other items, while the global developments toward decarbonization may affect prices through tighter supply and demand conditions for fossil fuels and higher energy costs during the transition process. With firms' behavior shifting more toward raising wages and prices, it is necessary to pay even closer attention than before to the possible impact of such global supply shocks on inflation in Japan.

Chart 1-1-41: Demographic Outlook



Sources: Ministry of Internal Affairs and Communications; National Institute of Population and Social Security Research; Japan Institute for Labour Policy and Training.
Note: The shaded areas denote projection periods. The population projections are by the National Institute of Population and Social Security Research. The projection for the number of employed persons is calculated based on projections by the Japan Institute for Labour Policy and Training.

Chart 1-1-42: Import Price Index



Source: Bank of Japan.

B. Monetary Policy Conduct until the Early 2010s

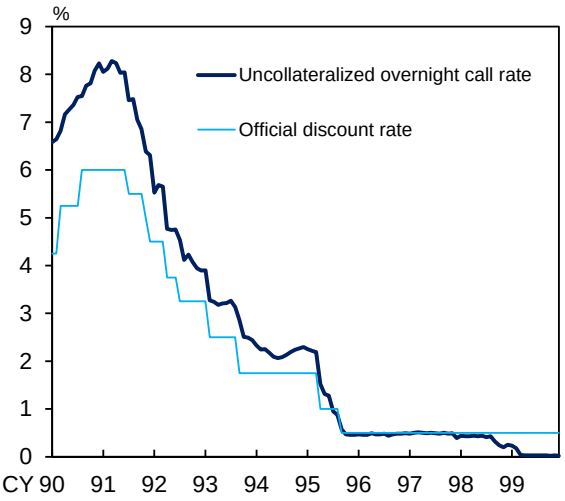
In response to the developments in economic activity and prices since the burst of the bubble, the Bank cut policy rates in the late 1990s. In 1999, the Bank introduced the world's first zero interest rate policy and forward guidance, which it called the "policy duration effect" at the time. Subsequently, the Bank successively introduced a range of unconventional monetary policy measures, including the Quantitative Easing Policy in the 2000s, a series of monetary easing measures after the 2008 Global Financial Crisis, and the Comprehensive Monetary Easing Policy in the early 2010s. The transmission mechanisms of the monetary easing envisaged by these measures are as follows.

Policy Rate Reductions and Introduction of the Zero Interest Rate Policy in the 1990s

In July 1991, the Bank began easing monetary policy by lowering the official discount rate, which was the primary monetary policy instrument at the time, from 6.0 percent to 5.5 percent (Chart 1-2-1). The uncollateralized overnight call rate, a short-term market interest rate, fell from a peak of over 8 percent in 1991 to less than 0.5 percent in 1995.[9]

While, as a result, the room for lowering short-term interest rates had shrunk in the latter half of the

Chart 1-2-1: Bank of Japan Policy Rates

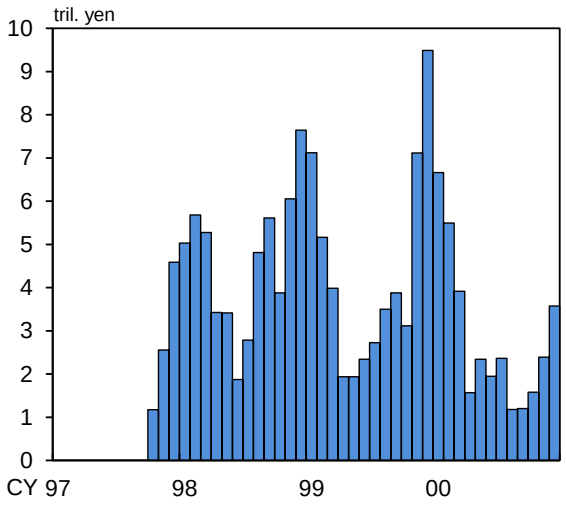


Source: Bank of Japan.

[9] In March 1995, in response to changes in financial markets following events such as the liberalization of interest rates in the 1990s (the liberalization of deposit interest rates was completed in 1994), the Bank introduced a new framework for the conduct of monetary policy in which, in addition to the official discount rate, guiding market interest rates was used as a policy instrument. Subsequently, under the new Bank of Japan Act that came into effect in 1998, monetary policy such as the policy with regard to guiding market interest rates is to be decided at each Monetary Policy Meeting.

1990s, the Bank supplied ample amounts of longer-term funds in 1997 during the phase of heightened financial instability in Japan, and in 1998, in response to the deterioration in economic activity and prices, lowered the target for short-term interest rates (the uncollateralized overnight call rate) to "around 0.25 percent" and introduced measures to support corporate financing, including the active use of Purchases of CP with Repurchase Agreements (Chart 1-2-2). Subsequently, in February 1999, the Zero Interest Rate Policy was introduced, and in April 1999, the Bank introduced forward guidance stating that it would continue with this policy "until deflationary concern is dispelled" (Chart 1-2-3).

Chart 1-2-2: Amount Outstanding of Purchases of CP with Repurchase Agreements



Source: Bank of Japan.

Chart 1-2-3: Zero Interest Rate Policy (CY 1999 to 2000)

Stance of Money Market Operations

- "The Bank of Japan will provide more ample funds and encourage the uncollateralized overnight call rate to move as low as possible."

"Policy Duration Effect" (Forward Guidance)

- The Bank of Japan explicitly committed to continuing with the zero interest rate policy "until deflationary concern is dispelled."

Quantitative Easing Policy: Assumed Transmission Mechanisms and Effects

In August 2000, the Bank lifted its Zero Interest Rate Policy, judging that the situation had reached a point where deflationary concerns had been dispelled. However, as the economy subsequently deteriorated, triggered by the burst of the global IT bubble, the Bank introduced its Quantitative Easing Policy in March in order to prevent a continuing decline in prices and establish a foundation for sustained economic growth (Chart 1-2-4).

The Quantitative Easing Policy consisted of three main components: (1) changing the Bank's main operating target for money market operations to the outstanding balance of the current accounts at the Bank and providing ample liquidity under a target for current account balances that substantially exceed required reserves (Chart 1-2-5), (2) continuing with the provision of ample liquidity until the year-on-year rate of change in the CPI (less fresh food) registered zero percent or above in a stable manner (forward guidance), and (3) purchasing long-term Japanese government bonds (JGBs) up to the amount of banknotes in circulation if deemed necessary for the smooth provision of liquidity. This policy is regarded to have been effective primarily in terms of pushing down longer-term nominal interest rates through forward guidance and ensuring stability in the financial system through the provision of ample liquidity.[10] That is, the Bank's announcement that it would continue this policy framework "until the year-on-year rate of change in the CPI less fresh food registers at or above zero percent in a stable

Chart 1-2-4: Quantitative Easing Policy (CY 2001 to 2006)

Change in the Operating Target for Money Market Operations

- Main operating target:
  From the uncollateralized overnight call rate to the current account balances at the BOJ

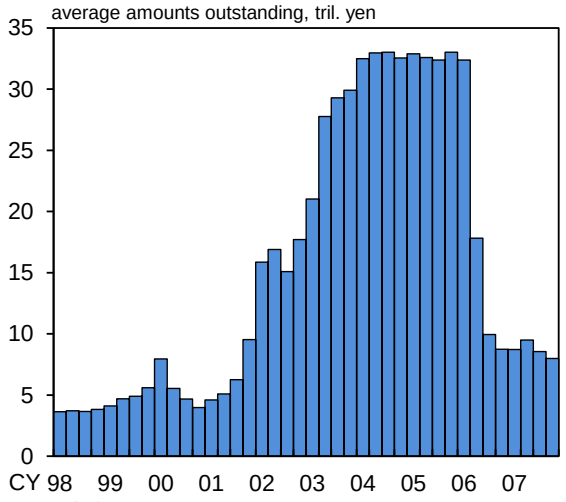
Strong Commitment in Terms of Policy Duration

- "The new procedures for money market operations continue to be in place until the consumer price index (excluding perishables) registers stably a zero percent or an increase year on year."
- Aim:
  - ➢ Affect people's expectations in order to remove the deflationary bias
  - ➢ Fall in interest rates across the yield curve

Increase in the Amount of JGB Purchases

- In order to provide funds smoothly, increase the amount of outright purchase of long-term JGBs if necessary
- Secure the credibility of monetary policy by keeping the outstanding amount of long-term JGBs held by the BOJ below the outstanding balance of banknotes issued

Chart 1-2-5: BOJ Current Account Balances



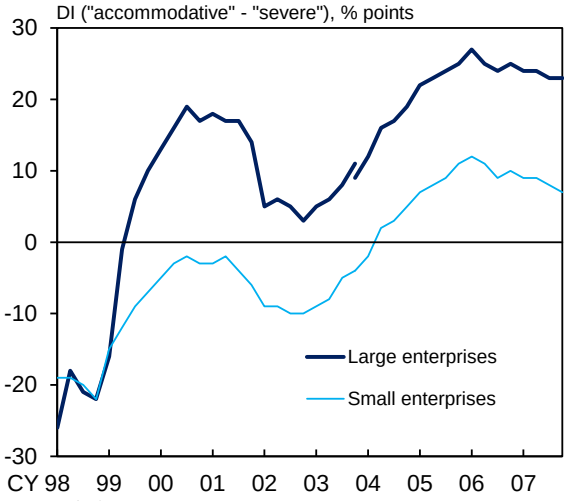
Source: Bank of Japan.

[10] For a survey of the effects of the Quantitative Easing Policy, see Ugai (2007).

Ugai, Hiroshi (2007), "Effects of the Quantitative Easing Policy: A Survey of Empirical Analyses," *Monetary and Economic Studies*, Vol.25(1), pp.1-48.

manner" reinforced market expectations that the low interest rate environment would continue for the time being. This pushed down market interest rates, including on term instruments. In addition, the ample provision of liquidity, mainly through the provision of short-term funding to financial institutions (through bill purchase operations, etc.), alleviated financial institutions' liquidity concerns.[11,12] Against this background, combined with progress by financial institutions in restoring their capital and adjusting their balance sheets, banks' lending stance gradually became more active (Chart 1-2-6). Moreover, with the global economy achieving high growth rates toward the latter half of the 2000s, the corporate sector also showed some positive developments such as a cyclical rise in business fixed investment.

Chart 1-2-6: Lending Attitudes of Financial Institutions



Source: Bank of Japan.
Note: There is a discontinuity in the data for December 2003 due to a change in the survey framework.

[11] Meanwhile, the pace of JGB purchases remained unchanged after having been raised from 400 billion yen per month before the introduction of the Quantitative Easing Policy to 1.2 trillion yen per month in October 2002.

[12] In addition, from November 2002 to September 2004, the Bank purchased stocks held by financial institutions in order to ensure the stability of the financial system.

Monetary Easing after the Global Financial Crisis and the Comprehensive Monetary Easing Policy: Assumed Transmission Mechanisms and Effects

In the phase following the Global Financial Crisis in the fall of 2008, the Bank lowered its target for short-term interest rates to "around 0.1 percent" and took various measures to ensure stability in financial markets and support corporate financing (Chart 1-2-7). Specifically, in addition to introducing U.S. dollar funds-supplying operations in coordination with other central banks, the Bank introduced the Complementary Deposit Facility to enable the active supply of yen funding and provided ample funding under this facility (Charts 1-2-8 and 1-2-9). Furthermore, in order to facilitate corporate financing, the Bank purchased CP and corporate bonds, expanded eligible collateral, and introduced the Special Funds-Supplying Operations to Facilitate Corporate Financing (Chart 1-2-10).[13] Under these circumstances, the stability of Japan's financial system was maintained and smooth corporate financing was ensured, despite the sharp decline in liquidity in global financial markets and the major downturn in demand worldwide.

While the global economy subsequently recovered from the sharp decline due to swift actions by central banks and massive fiscal stimulus packages, the pace of recovery was slow due to the prolonged adjustment of excessive debt in advanced economies and the European debt crisis. Global financial markets remained unstable and the exchange rate of the yen continued to appreciate, as will be discussed in more detail later. In this environment, the Comprehensive Monetary

Chart 1-2-7: Monetary Easing after the Global Financial Crisis (from CY 2008)

Reductions in the Policy Interest Rate

- Target for the uncollateralized overnight call rate: around 0.5% ⇒ around 0.3% (as of October 2008) ⇒ around 0.1% (as of December 2008)

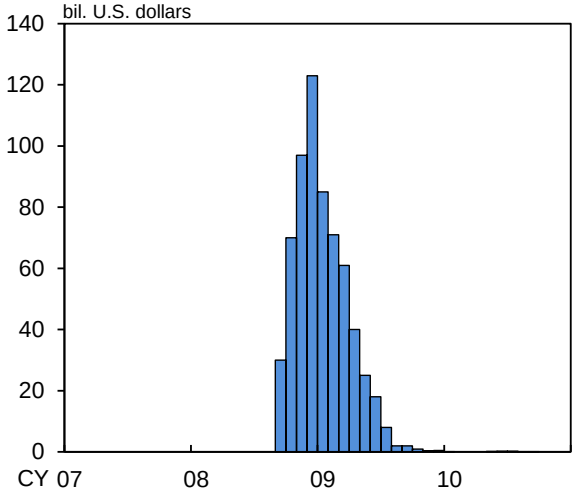
Measures to Ensure Stability in Financial Markets

- Introduction of U.S. dollar funds-supplying operations
- Introduction of the Complementary Deposit Facility
- Increase in outright purchases of JGBs and expansion in the range of JGBs accepted in outright purchases

Steps to Facilitate Corporate Financing

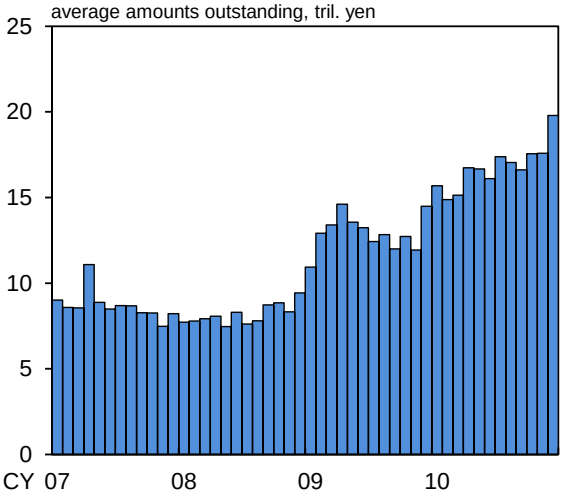
- Outright purchases of CP and corporate bonds
- Expansion of eligible collateral
- Introduction of special funds-supplying operations to facilitate corporate financing

Chart 1-2-8: Amount Outstanding of U.S. Dollar Funds-Supplying Operations



Source: Bank of Japan.

Chart 1-2-9: BOJ Current Account Balances

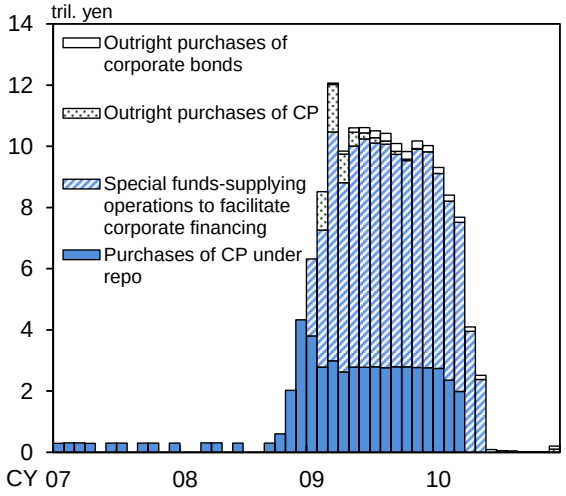


Source: Bank of Japan.

[13] In addition, in order to ensure the stability of the financial system, the Bank implemented measures such as the resumption of purchases of stocks held by banks and the provision of subordinated loans to financial institutions.

Easing Policy introduced in 2010 was designed to add downward pressure not only on short-term interest rates but also on longer-terms interest rates and to reduce various risk premiums through the purchase of risk assets (Chart 1-2-11). In terms of influencing interest rates, the Bank changed its target for short-term interest rates from "around 0.1 percent" to "around 0 to 0.1 percent," and announced that it would "maintain the virtually zero interest rate policy until it judges that price stability is in sight." In addition, it established the Asset Purchase Program and – while maintaining its existing policy on JGB purchases other than through the Asset Purchase Program – introduced a new program to purchase JGBs in the short- to medium-term zone to put downward pressure on longer-term market interest rates of around one to three years (Chart 1-2-12). Purchases of JGBs through the Asset Purchase Program initially covered those with remaining maturities of one to two years, but in 2012 this was expanded to JGBs with remaining maturities of one to three years. In order to reduce risk premiums, the Bank, through the Asset Purchase Program, purchased risk assets such as CP, corporate bonds, exchange-traded funds (ETFs), and Japan real estate investment trusts (J-REITs), in addition to JGBs. As a result, market participants became more proactive in their investment stance, adding further downward pressure on various risk premiums. Moreover, from the perspective of encouraging more proactive behavior by financial institutions and an increase in positive funding demand from firms and households, the Bank also introduced the Fund-Provisioning Measure to Stimulate Bank Lending, under which it provides long-term funds – up to an amount equivalent to the net increase in lending – at a low interest rate to financial institutions at their request.

Chart 1-2-10: Amount Outstanding of Operations Utilizing Corporate Debt



Source: Bank of Japan.

Chart 1-2-11: Comprehensive Monetary Easing Policy (CY 2010 to 2013)

Change in the Guideline for Money Market Operations

- Target for the uncollateralized overnight call rate: around 0.1%
  ⇒ around 0 to 0.1% (as of October 2010)
  <virtually 0%>

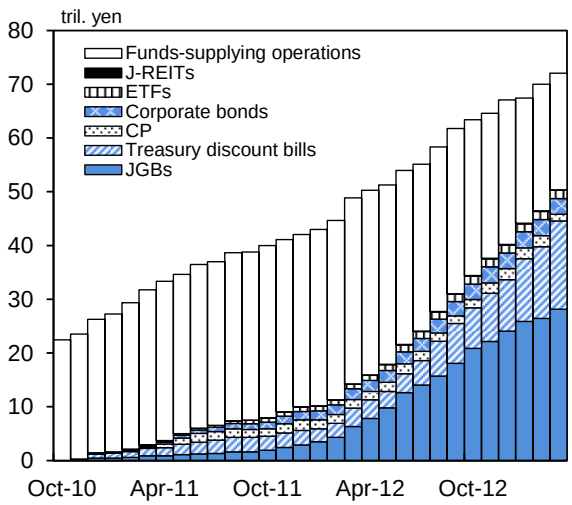
Clarification of Policy Time Horizon

- The Bank will maintain the virtually zero interest rate policy until it judges that price stability is in sight.

Establishment of an Asset Purchase Program

- Expansion of JGB purchases,* purchases of risk assets (CP, corporate bonds, ETFs, J-REITs)
  * Remaining maturity of eligible JGBs :
  "More than 1 year and up to 2 years" at first
  ⇒Extended to "More than 1 year and up to 3 years" in April 2012
- The Bank established, as a temporary measure, an asset purchase program on its balance sheet to purchase various financial assets, such as government securities and risk assets and to conduct the fixed-rate funds-supplying operations.

Chart 1-2-12: Amount Outstanding of Purchases and Loans through the Asset Purchase Program



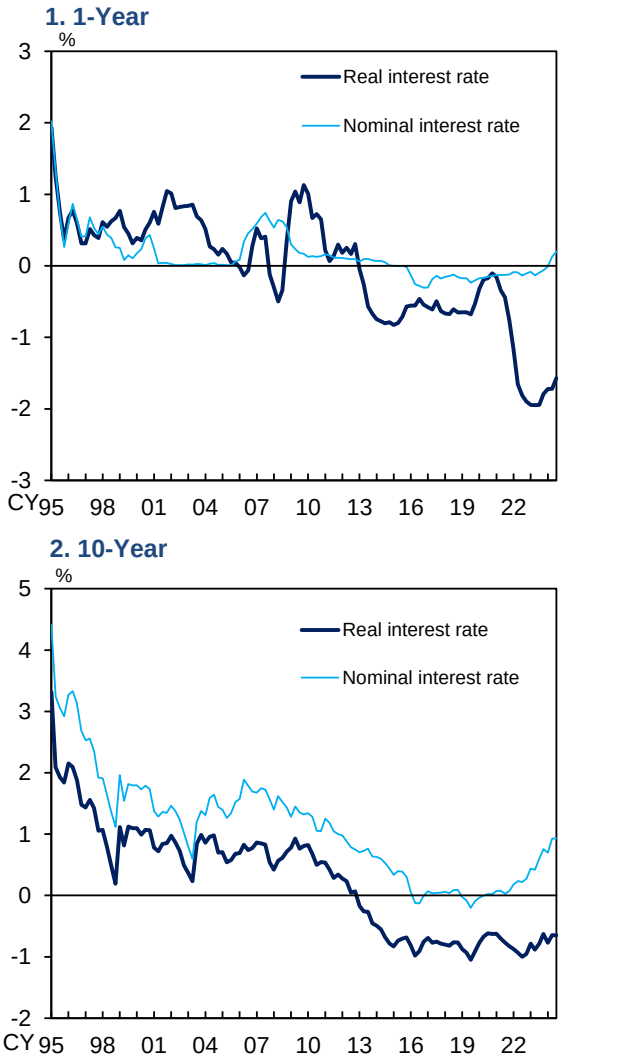
Source: Bank of Japan.

Easing Effects of Monetary Policy from the Late 1990s to the Early 2010s

Thus, from the end of the 1990s onwards, the Bank introduced various unconventional monetary policy measures as nominal short-term interest rates approached zero percent. The effects of these policies need to be evaluated in light of the challenges and external environment the economy faced at the time when each policy measure was introduced.

Looking at developments in real interest rates, which are often regarded as the primary channels for the effects of monetary easing, shows that from the end of the 1990s to the beginning of the 2010s – with inflation and inflation expectations falling or hovering at low levels – the policies did not substantially lower real interest rates, both short- and long-term (Chart 1-2-13). During the Quantitative Easing Policy of the 2000s, the decline in longer-term nominal interest rates was achieved primarily through forward guidance linked to the year-on-year rate of change in the CPI. Meanwhile, the Bank's main fund-provision measure was to provide loans to financial institutions with maturities of less than one year, with on the aim of ensuring the stability of the financial system through the provision of ample liquidity, and the Bank did not work on pushing down longer-term nominal interest rates through asset purchases. Subsequently, under the Comprehensive Monetary Easing Policy introduced in 2010, the Bank decided to exert downward pressure on longer-term interest rates by increasing JGB purchases and expanding the maturities of JGBs to be purchased, in addition to laying out forward guidance. However, JGB purchases under the Asset Purchase Program established under the Comprehensive Monetary Easing Policy were limited to JGBs with a

Chart 1-2-13: Nominal and Real Interest Rates



Sources: Bank of Japan; QUICK, "QUICK Monthly Market Survey <Bonds>"; Consensus Economics Inc., "Consensus Forecasts"; Bloomberg.
Note: Figures for real interest rates for each maturity are calculated as government bond yields minus the composite index of inflation expectations (staff estimates) for the corresponding maturity.

remaining maturity of three years or less, so that the effects of such purchases in terms of pushing down the yield curve as a whole were limited.

However, these developments in real interest rates should not be the sole criterion for evaluating monetary policy at the time. From the end of the 1990s to the mid-2000s, especially during the first half of this period, firms continued to be under pressure to adjust their balance sheets and the risk of instability of the financial system remained, impeding the transmission of monetary easing effects. In this regard, the policy of providing large amounts of liquidity to address the issue of stabilizing the financial system, which was the root cause of the various problems facing the Japanese economy at the time, was highly effective in the sense that it mitigated liquidity concerns and averted a further deterioration of the economy.[14]

In a similar vein, during the phase after the Global Financial Crisis, when liquidity in financial markets rapidly declined, the Bank took a whole variety of measures to ensure the stability of financial markets and support corporate financing by introducing U.S. dollar funds-supplying operations in cooperation with foreign central banks, and by purchasing CP and corporate bonds for the first time. This mitigated the impact of the unprecedented financial crisis triggered by events

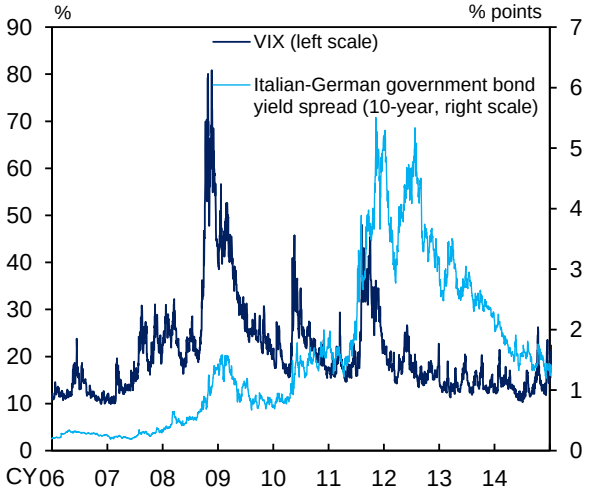
[14] Bowman et al. (2015) and Shioji (2019) point out that under a fragile financial system, the provision of liquidity through the Quantitative Easing Policy had an easing effect by stabilizing banks' liquidity positions and promoting lending.

Bowman, David, Fang Cai, Sally Davies, and Steven Kamin (2015), "Quantitative Easing and Bank Lending: Evidence from Japan," *Journal of International Money and Finance*, Vol.57, pp.15-30.

Shioji, Etsuro (2019), "Quantitative 'Flooding' and Bank Lending: Evidence from 18 Years of Near-Zero Interest Rate," *Journal of the Japanese and International Economies*, Vol.52, pp.107-120.

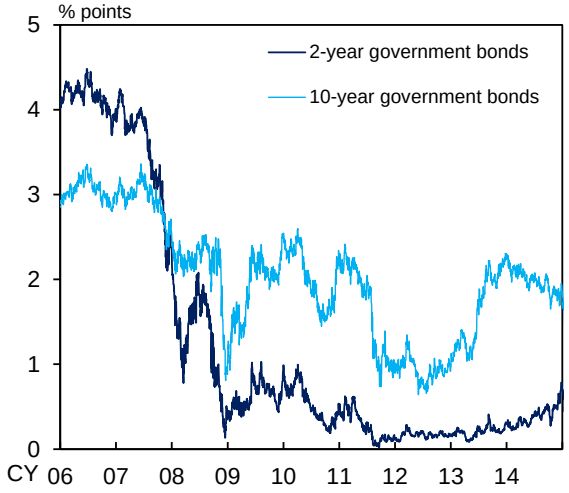
such as the collapse of Lehman Brothers on economic activity, prices, and financial conditions in Japan. However, even after the acute deterioration in economic and financial conditions had subsided, the recovery of overseas economies remained sluggish for some time, especially among advanced economies, and the European debt crisis gradually became more serious. Global financial markets remained unstable, and with U.S. and European central banks introducing powerful monetary easing policies and interest rates in Japan already low and leaving little room for further declines, the gap between interest rates in Japan and abroad narrowed considerably, leading to a continued appreciation of the yen (Charts 1-1-12, 1-2-14, and 1-2-15).[15] Domestically, the Great East Japan Earthquake had a serious impact on the economy. Given these severe circumstances, the Bank under its Comprehensive Monetary Easing Policy pursued more powerful monetary easing than in the 2000s; however, this still did not provide sufficient stimulus to economic activity and prices.

Chart 1-2-14: Financial Market Sentiment



Source: Bloomberg.

Chart 1-2-15: Yield Differentials (United States - Japan)



Source: Bloomberg.

[15] For details on developments in exchange rates over the past 25 years, including in the wake of the Global Financial Crisis, see Appendix 6.

C. Impact of the Large-Scale Monetary Easing since 2013 on Economic Activity and Prices[16]

Transmission Mechanisms of the Large-Scale Monetary Easing

The Bank set a price stability target of 2 percent in January 2013 and introduced QQE in April of that year. It subsequently expanded QQE in October 2014, introduced QQE with a Negative Interest Rate in January 2016, and Quantitative and Qualitative Monetary Easing with Yield Curve Control (QQE with YCC) in September 2016.[17]

In terms of the transmission mechanisms through which this large-scale monetary easing would affect economic activity and prices, the Bank assumed that the primary channels would be a decline in real interest rates through (1) higher

[16] In September 2016 (in its *Comprehensive Assessment: Developments in Economic Activity and Prices as Well as Policy Effects since the Introduction of Quantitative and Qualitative Monetary Easing (QQE)*), the Bank examined how the mechanisms of large-scale monetary easing worked, what factors hindered the achievement of the price stability target of 2 percent, what effects the easing measures, including the negative interest rates introduced in January 2016, had, and the impact that these measures had on financial markets and financial institutions. Subsequently, in March 2021, the Bank conducted a further assessment (the *Assessment for Further Effective and Sustainable Monetary Easing*), given that achieving the price stability target of 2 percent was expected to take more time. The analyses in this and the next section are based on the analyses conducted in these two assessments and review the effects and side effects of policies from a broader perspective.

[17] In addition, following the outbreak of the COVID-19 pandemic, the Bank took measures to (1) provide financing support to firms (through increased purchases of CP, corporate bonds, etc. and the establishment and expansion of the Special Funds-Supplying Operations to Facilitate Financing in Response to the Novel Coronavirus (COVID-19)), (2) ensure financial market stability (through further active purchases of JGBs and the expansion of U.S. dollar funds-supplying operations), and (3) curb risk premiums in asset markets (through increased purchases of ETFs and J-REITs).

inflation expectations brought about by the Bank influencing expectations and (2) a reduction in nominal interest rates as a result of measures such as large-scale JGB purchases (Chart 1-3-1).

With regard to inflation expectations, the Bank sought to influence people's inflation expectations by implementing large-scale monetary easing under a strong and clear commitment to the price stability target of 2 percent, that is, the promise to continue with QQE as long as necessary until the price stability target of 2 percent was maintained in a stable manner. In September 2016, in order to strengthen forward-looking expectations formation through the commitment of the central bank to achieving price stability, the Bank introduced an inflation-overshooting commitment, in which it promised to continue its policy of expanding the monetary base until the year-on-year rate of increase in the CPI (less fresh food) exceeded the price stability target of 2 percent in a stable manner (Chart 1-3-2).

With regard to nominal interest rates, the Bank exerted downward pressure across the yield curve by newly conducting large-scale purchases of JGBs, including long-term and super-long-term JGBs, while abolishing the Asset Purchase Program, under which it purchased short- and medium-term JGBs.[18] Furthermore, in January 2016, the Bank introduced QQE with a Negative Interest Rate, which, in combination with large-scale JGB purchases, further strengthened downward pressure on nominal interest rates while avoiding excessive pressure on financial institutions' profits by establishing a three-tier system for current accounts at the Bank and keeping the amount of policy-rate balances on

Chart 1-3-1: Quantitative and Qualitative Monetary Easing

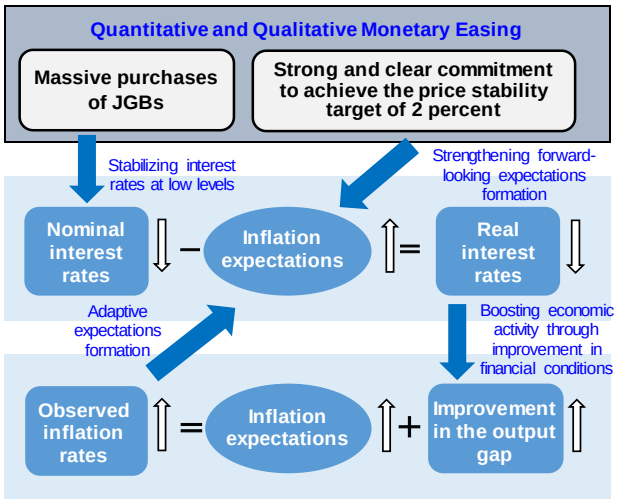
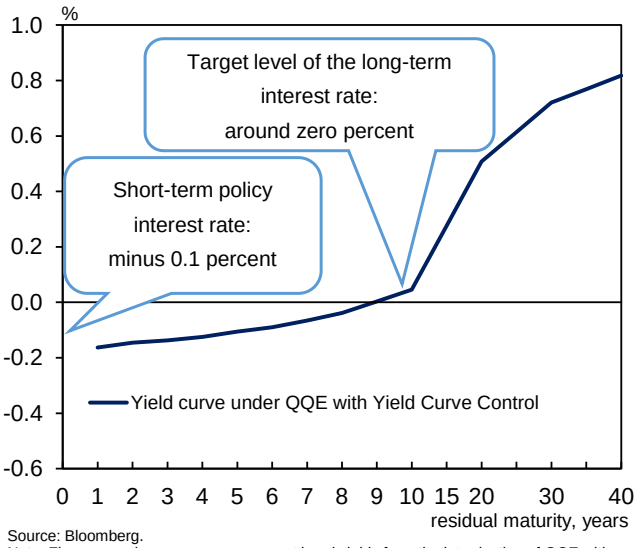


Chart 1-3-2: Framework of QQE with Yield Curve Control

1. Yield Curve Control



Source: Bloomberg.
Note: Figures are the average government bond yields from the introduction of QQE with Yield Curve Control (September 21, 2016) to the modification of Yield Curve Control (December 20, 2022).

2. Inflation-Overshooting Commitment

The Bank will continue expanding the monetary base until the year-on-year rate of increase in the observed CPI (all items less fresh food) exceeds the price stability target of 2 percent and stays above the target in a stable manner.

- Achieving the price stability target means attaining a situation where the inflation rate is 2 percent on average over the business cycle.

[18] When QQE was introduced, the average remaining maturity of JGBs purchased increased from just under three years to about seven years, which is in line with the average maturity of outstanding JGBs.

which a negative interest rate was applied small. Subsequently, in September 2016, with monetary easing expected to continue for a long time in order to achieve the price stability target of 2 percent, the Bank introduced the YCC framework to keep nominal interest rates at an appropriate level, while taking not only the effects of easing but also its side effects into account.

By influencing inflation expectations and nominal interest rates in this way, large-scale monetary easing seems to have succeeded in lowering real interest rates into negative territory and keeping them there, thereby creating accommodative financial conditions (Chart 1-2-13). Meanwhile, overseas, the "risk-off" attitude in markets eased as the European debt crisis calmed down, and in 2013, the appreciation of the yen reversed and stock prices followed an upward trend as the U.S. Federal Reserve began to shift to a stance of tapering monetary easing. Combined with changes in the external environment, large-scale monetary easing likely worked to push up economic activity and prices.

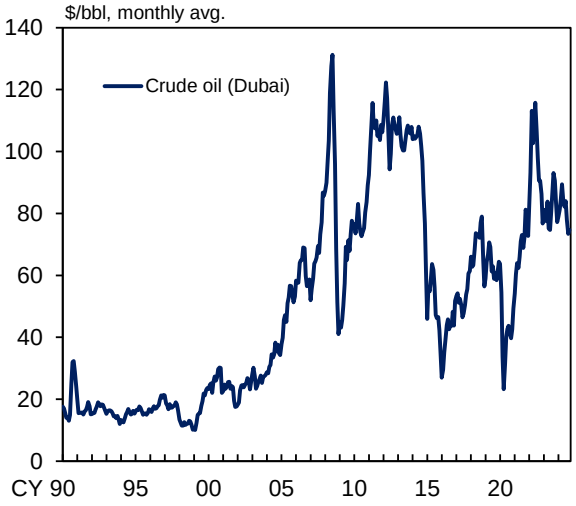
The following takes a look at the primary channels of the transmission mechanisms of monetary easing, namely, (1) the influencing of expectations and (2) the reduction in nominal interest rates, and then examines the impact of the resulting decline in real interest rates on economic activity and prices.

Influencing Expectations

First, the impact of large-scale monetary easing on inflation expectations through forward-looking expectations formation is examined. While the composite indicator of households', firms', and experts' inflation expectations briefly rose after the introduction of QQE, it subsequently declined again due to factors such as the fall in crude oil prices, and it is difficult to clearly determine the impact of large-scale monetary easing simply by looking at the trend (Charts 1-1-27 and 1-3-3). In academia, too, views are divided regarding the extent to which monetary easing can influence expectations when nominal short-term interest rates are at the effective lower bound.[19]

In fact, analyses show that inflation expectations in Japan are not anchored at the Bank's price stability target, so that adaptive expectations formation has played a substantial role (Chart 1-3-4).[20] In addition, inflation expectations in Japan appear to be formed not only based on the actual rate of inflation at each point in time, but are also strongly influenced by past experience (Chart 1-3-5). [21] For example, examining generational

Chart 1-3-3: Crude Oil Prices



Source: Bloomberg.

[19] For details on academic studies on the effects of monetary policy on expectations and an empirical analysis using a vector autoregressive (VAR) model, see Appendix 7.

[20] This point was also emphasized in the Bank's 2016 *Comprehensive Assessment: Developments in Economic Activity and Prices as Well as Policy Effects since the Introduction of Quantitative and Qualitative Monetary Easing (QQE)* and its 2021 *Assessment for Further Effective and Sustainable Monetary Easing*.

[21] When considering people's inflation expectations formation in a theoretical framework, it has often traditionally been assumed that expectations formation is based on rational expectations under full information, with economic entities using all available information to form expectations. However, in recent years, given the complexity of the expectations formation process, alternative hypotheses such as the "sticky information hypothesis" and the "rational inattention hypothesis" have received considerable support. For more details, see Bank

differences in the formation of households' view on prices shows that, in Japan, those who have not experienced inflation – the relatively younger generation – tend to have lower inflation expectations, and their inflation expectations are less sensitive to price fluctuations (Chart 1-3-6).[22] As mentioned earlier, in Japan, behavior and a mindset based on the assumption that wages and prices will not increase easily became entrenched due to the long experience of deflation, and even as economic activity improved clearly, it took time for this behavior and mindset to be transformed.

The extent to which large-scale monetary easing has pushed up inflation expectations through forward-looking expectations formation and has affected price changes can be examined using a vector autoregressive (VAR) model (Chart 1-3-7). The result shows that (1) shocks to inflation expectations have become one of the factors affecting price fluctuations in Japan, and (2) since 2013, Japan has escaped from a situation in which shocks to inflation expectations pushed down prices; (3) however, the changes that large-scale monetary easing brought about in inflation expectations through forward-looking expectations formation alone were not sufficiently effective to anchor inflation at 2 percent. That is, adaptive expectations formation has had a larger impact on the formation of inflation expectations in

Chart 1-3-4: Estimation of Adaptive Expectations Formation

1. Equations

Equation (a): Contribution of observed inflation to inflation expectations 1 year ahead (θ_1)

Inflation expectations 1 year ahead =
θ_1 × Observed inflation (lagged 1 quarter)
+ $(1 - \theta_1)$ × Inflation expectations 6-10 years ahead

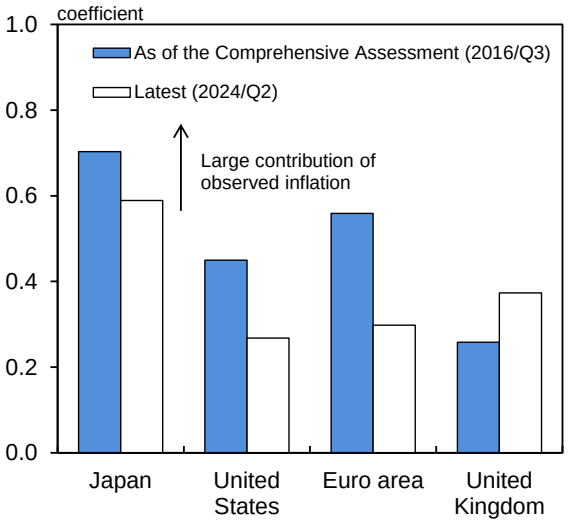
Equation (b): Contribution of observed inflation to inflation expectations 6-10 years ahead (θ_2)

Inflation expectations 6-10 years ahead =
θ_2 × Observed inflation (lagged 1 quarter)
+ $(1 - \theta_2)$ × Central bank price stability target (2%)

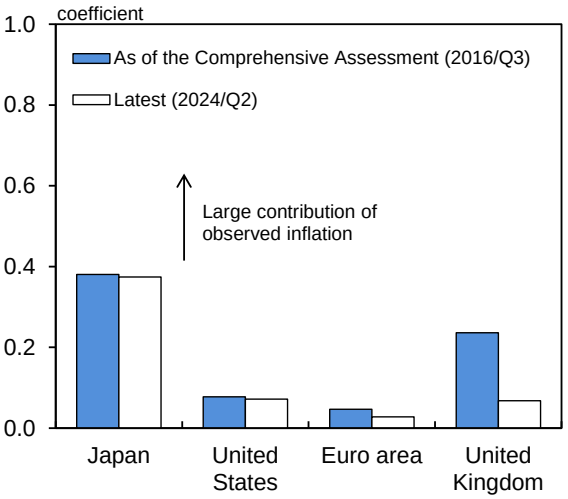
Estimation period: From 2000/Q1 for Japan and the United States, 2003/Q2 for the euro area, and 2005/Q1 for the United Kingdom to periods shown in the legends. The estimations use core inflation rates as observed inflation rates.

2. Estimation Results

(a) Inflation Expectations 1 Year Ahead (θ_1)



(b) Inflation Expectations 6-10 Years Ahead (θ_2)



Sources: Consensus Economics Inc., "Consensus Forecasts"; Ministry of Internal Affairs and Communications; BLS; Eurostat; ONS.

of Japan (2021).

Bank of Japan (2021), *Assessment for Further Effective and Sustainable Monetary Easing*, Appendix 1.

[22] Chart 1-3-6 examines generational differences in the inflation expectations formation of Japanese households using microdata from the Bank of Japan's *Opinion Survey on the General Public's Views and Behavior*. Specifically, after controlling for business sentiment and other factors, (1) the extent to which the level of inflation expectations differs and (2) the extent to which the impact of (sensitivity to) inflation perceptions (actual prices) on the formation of inflation expectations differs depending on respondents' year of birth are examined.

Japan, and it was not easy to change the behavior and mindset based on the assumption that wages and prices will not increase easily.

Chart 1-3-5: Hypotheses Regarding Inflation Expectations Formation

Full-Information Rational Expectations	・Economic entities form expectations using all information available at the time. ・Although many macroeconomic models are based on this hypothesis, recent empirical research using micro data shows that the explanatory power of such models is limited.
Sticky Information	・Economic entities do not always update their expectations due to costs of acquiring information.
Rational Inattention	・Given limited information processing capacity, economic entities rationally choose to pay less attention to information to which they attach little importance.

Chart 1-3-6: Inflation Expectations by Cohort

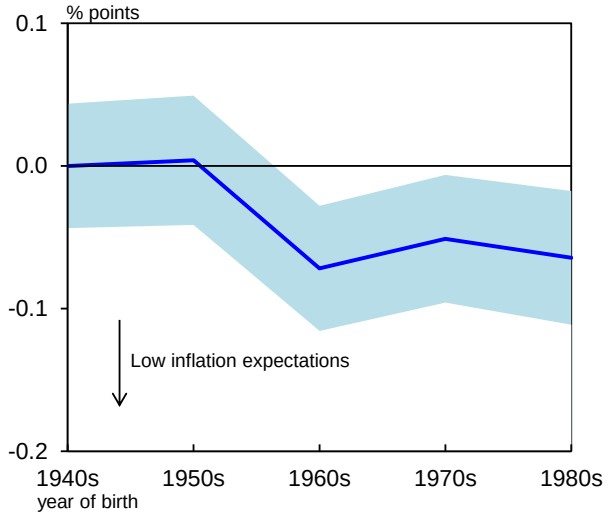
1. Equation

$$(\text{Inflation expectations})_{i,t} = \alpha + \Sigma\beta_m(\text{Cohort dummy})_{m,i,t} + \Sigma\gamma_m(\text{Cohort dummy})_{m,i,t} \times (\text{Inflation perceptions})_{i,t} + \theta\,(\text{Control variables})_{i,t}$$

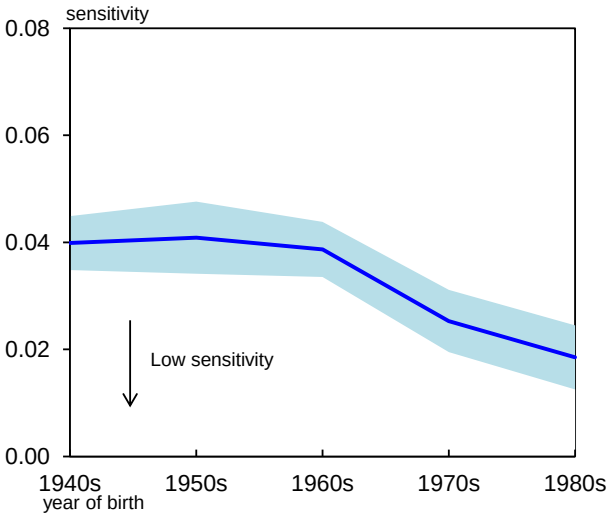
Estimation period: 2006/Q3–2020/Q4. The number of observations is approximately 60,000. The cohort dummies are calculated using the age group respondents fell into at the time of each survey. Questions ask respondents to give their inflation expectations and perceptions in numbers. For the analysis, responses within the range of –5 to +5 percent of inflation expectations are used. Control variables include respondents' impressions of economic conditions, income, gender, etc.

2. Estimation Results

(1) Difference in Expected Inflation Rate across Cohorts (β)

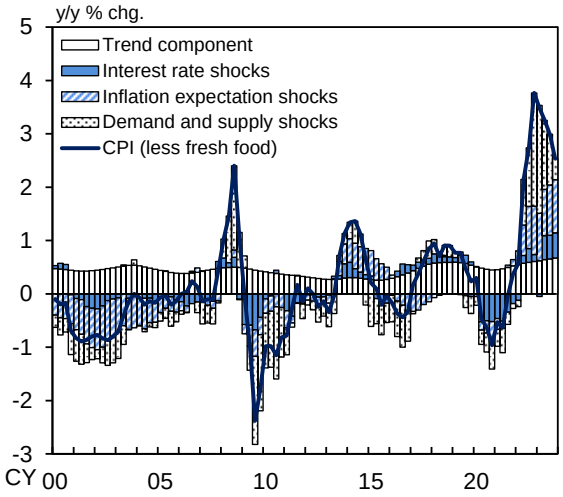


(2) Difference in Sensitivity across Cohorts (γ)



Source: Bank of Japan.
Notes: 1. β in panel 2 (1) is the difference from individuals born in the 1940s.
2. The shaded areas in panel 2 indicate ±1.5 standard errors.

Chart 1-3-7: Historical Decomposition of CPI



Sources: Ministry of Internal Affairs and Communications; Bank of Japan; Bloomberg; Consensus Economics Inc., "Consensus Forecasts"; QUICK, "QUICK Monthly Market Survey <Bonds>."
Note: The CPI figures exclude the effects of consumption tax hikes, etc. For details on the estimation method, see Appendix 7 and Kaihatsu, Nakano and Yamamoto (2024).

Reduction in Nominal Interest Rates

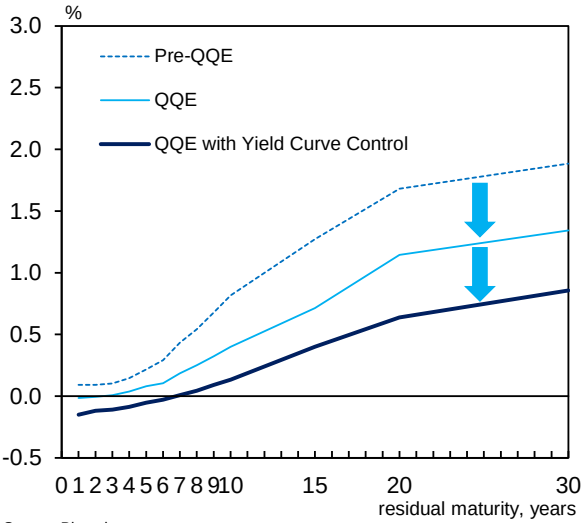
Second, the effects of pushing down nominal interest rates through large-scale monetary easing are examined. The Bank's JGB purchases affect long-term interest rates through (1) the effect of the daily conduct of JGB purchases on supply and demand in the secondary market (the flow effect) and (2) the effect of an increase in the Bank's JGB holdings on market participants' risk allocation (the stock effect) (Chart 1-3-8). Moreover, under the YCC framework introduced in September 2016, (3) long-term interest rates may also be affected by the fact that, when they approach the upper bound of the announced range, the Bank increases its purchases – and market participants factor this in.

Chart 1-3-9 presents a quantitative analysis of these downward effects on interest rates, controlling for various factors that could affect interest rate formation in Japan, such as economic activity and financial conditions.[23] The results show that (1) large-scale monetary easing has exerted downward pressure on nominal interest rates mainly through the stock effect, and (2) the Bank's setting of the YCC range had the effect of restraining nominal interest rate increases during the period of rising long-term interest rates from 2022 to 2023. On average, JGB purchases have pushed down long-term interest rates by about 1 percentage point.

Meanwhile, the Negative Interest Rate Policy introduced in January 2016 significantly pushed down not only short-term interest rates but also long-term interest rates (Chart 1-3-10). (1) The growing awareness that short-term interest rates could become negative likely acted to lower the

[23] For details on the formation of the yield curve under large-scale JGB purchases, see Appendix 8.

Chart 1-3-8: Yield Curves



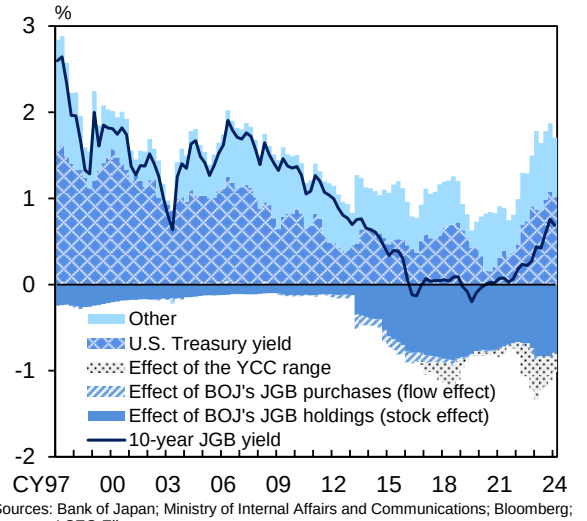
Source: Bloomberg.
Note: Figures for the pre-QQE period are the averages between January 3, 2012, and April 3, 2013, figures for the QQE period are the averages between April 4, 2013, and September 20, 2016, and figures for the QQE with Yield Curve Control period are the averages between September 21, 2016, and March 18, 2024.

Chart 1-3-9: Impact of the BOJ's JGB Purchases on Interest Rates

1. Estimation Results: Long-Term Interest Rate Models

Dependent variable:	(1) 10-year yield	(2) 10-year yield (sum of estimated coefficients)	(2) 10-year expected short-term interest rate component	(2) 10-year term premium
10-year U.S. Treasury yields	0.238 ***	*0.238*	0.078 ***	0.159 ***
Uncollateralized overnight call rate	0.645 ***	*0.798*	0.798 ***	
CPI (less fresh food and energy)	0.045 ***	*0.082*	0.082 ***	
Monthly change in JGB holdings	-0.141 **	*-0.208*	-0.208 ***	
Risk adjusted share of BOJ's JGB holdings in total	-0.024 ***	*-0.018*	-0.009 ***	-0.009 **
Expectation of future changes in JGB holdings	-0.012 ***	*-0.014*		-0.014 ***
Ratio of fixed-rate purchase operations to JGB issuance	0.000	*-0.002*		-0.002 **
Probability that the upper bound of the YCC range is exceeded	-0.007 *	*-0.046*		-0.046 ***
Probability that the offer rate of fixed-rate purchase operations for consecutive days is exceeded	-0.021 ***	*-0.059*		-0.059 ***
Probability that the lower bound of the YCC range is exceeded	0.009	*0.025*		0.025 **
Constant	0.512 ***	*0.495*	0.476 ***	0.019
Adjusted R-squared	0.938	—	0.833	0.813
Estimation period	January 1997 to March 2024			

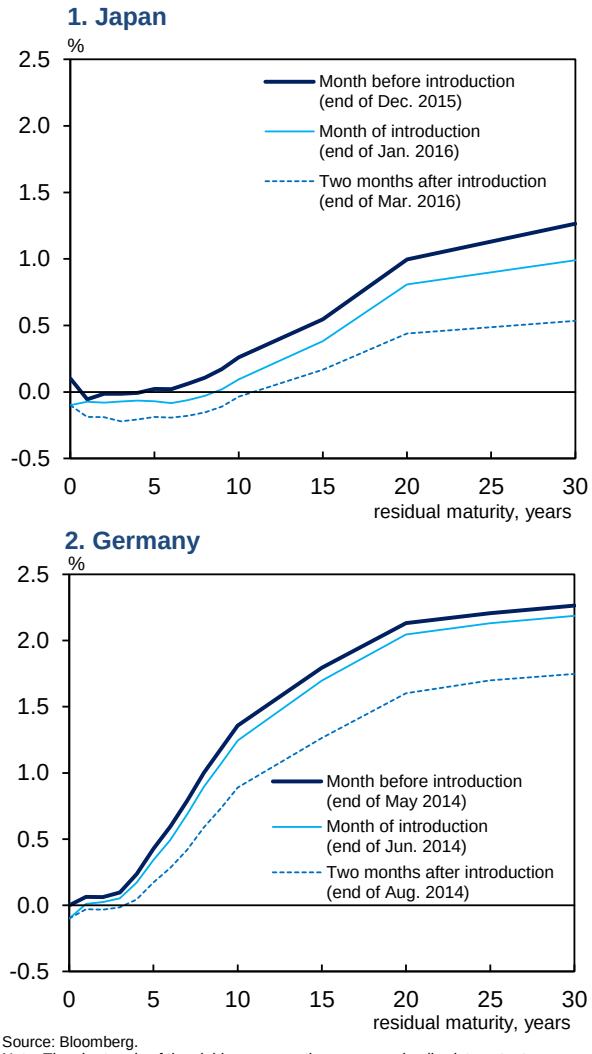
2. Sources of Changes in Long-Term Interest Rates



Sources: Bank of Japan; Ministry of Internal Affairs and Communications; Bloomberg; LSEG Eikon.
Notes: 1. ***, **, and * in the table denote statistical significance at the 1, 5, and 10 percent levels, respectively. See Nakazawa and Osada (2024) for details of the estimation.
2. Figures in the chart are calculated based on the averages of the coefficients obtained in models (1) and (2) in the table.

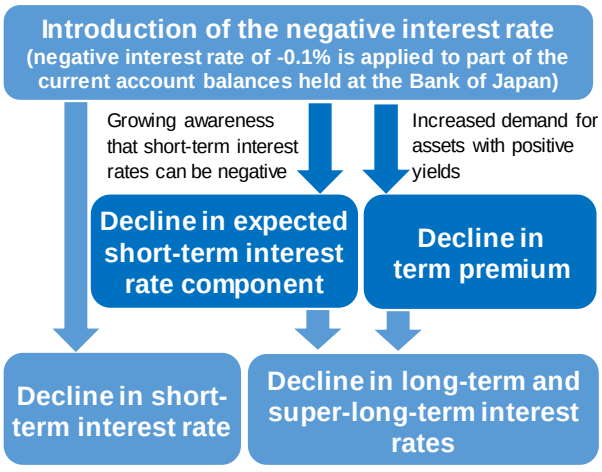
expected short-term interest rate component, and (2) the rising demand for assets with positive interest rates – the so-called "search for positive yield" – likely also acted to push down long-term and super-long-term interest rates through a reduction in term premiums (Chart 1-3-11). In this regard, a detailed examination of the downward effect on interest rates based on data from Japan and the euro area, where negative interest rate policies were introduced, shows that the effect tends to be larger for longer maturities.[24]

Chart 1-3-10: Changes in the Yield Curve before and after Introduction of a Negative Interest Rate Policy



Source: Bloomberg.
Note: The short ends of the yield curves are the announced policy interest rates.

Chart 1-3-11: Transmission Channels of the Negative Interest Rate Policy



[24] For details on the impact of negative interest rate policies on interest rate formation, see Appendix 9.

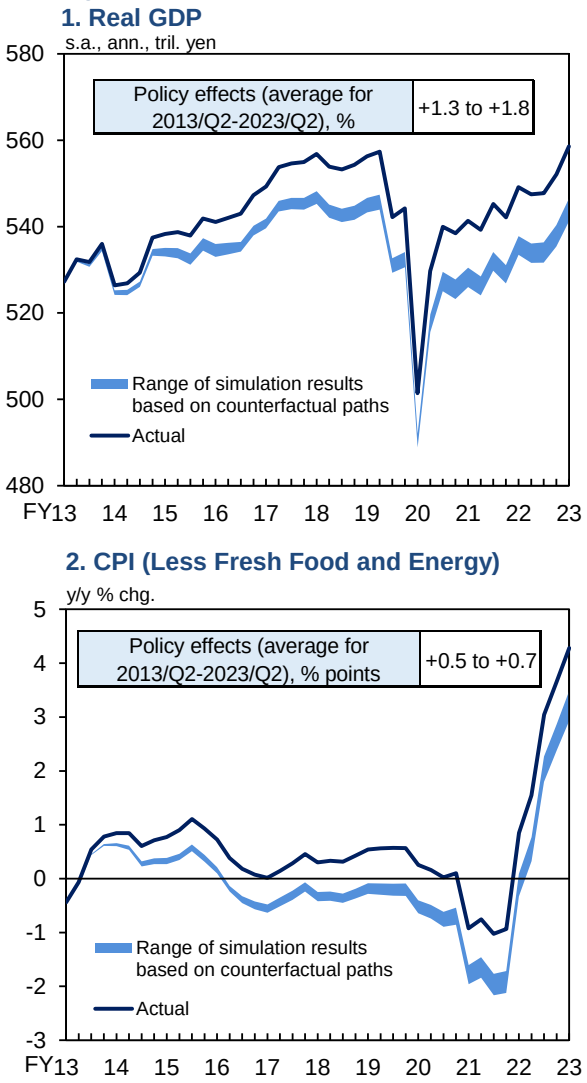
Impact on Economic Activity and Prices

Next, using several approaches, the impact of the reduction in real interest rates and achievement of accommodative financial conditions as a result of large-scale monetary easing on economic activity and prices through lower funding costs and positive effects on financial and capital markets is examined.[25]

The first approach uses the Bank's large-scale macroeconomic model (Q-JEM) to analyze the effects of the decline in interest rates across the entire yield curve on economic activity and prices through counterfactual simulations. Specifically, counterfactual developments in economic activity and prices in the absence of the introduction of large-scale monetary easing are estimated and then compared with actual developments (Chart 1-3-12). The analysis shows that real GDP from fiscal 2013 onward on average was 1.3 to 1.8 percent higher than it would have otherwise been, and the year-on-year rate of change in the CPI (less fresh food and energy) was 0.5 to 0.7 percentage point higher than it would have been. Looking at the positive effect on real GDP by transmission channel, a wide range of channels contributed to the increase vis-à-vis the counterfactual; meanwhile, looking at the positive effect by expenditure component, business fixed investment and private consumption made the largest contributions (Chart 1-3-13). Looking at the positive effect on the CPI, the output gap and medium- to long-term inflation expectations made similar contributions.

The second approach is to construct a large-scale time series model (Factor-Augmented Vector Autoregressive (FAVAR) model) using more than

Chart 1-3-12: Assessments of Policy Effects Using the Q-JEM

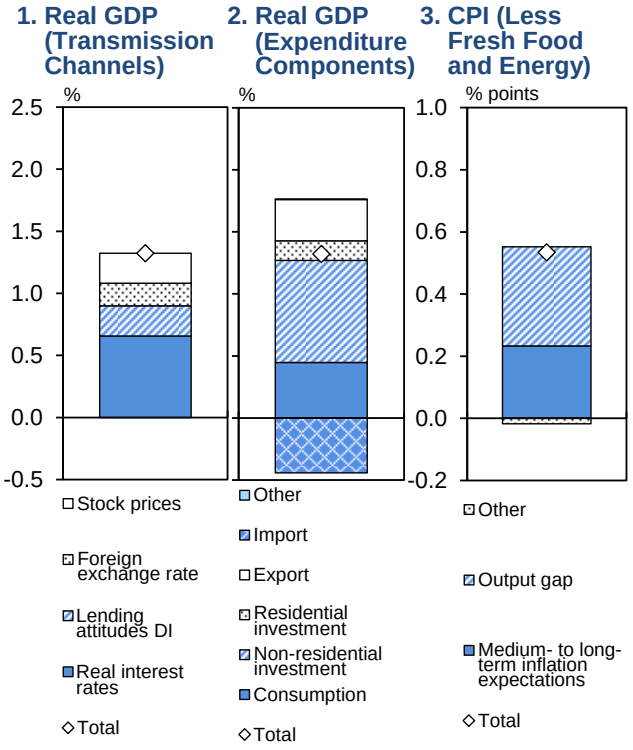


Sources: Ministry of Internal Affairs and Communications; Cabinet Office; Haba et al. (2024b).
Notes: 1. The CPI figures are staff estimates and exclude the effects of consumption tax hikes, policies concerning the provision of free education, and travel subsidy programs.
2. The range of the simulation results shows the maximum to minimum values at each time point across 16 simulation results.

[25] For details on the effects of large-scale monetary easing on economic activity and prices, see Appendix 10.

200 indicators and analyze the impact of the decline in the shadow rate, an indicator that aggregates the decline in interest rates across the yield curve, on economic activity and prices through counterfactual simulations (Chart 1-3-14). The results suggest that the series of monetary easing measures implemented since 2013 to some degree boosted industrial production and the employment and income situation, and may have raised the year-on-year rate of change in the CPI (less fresh food) by around 0.6 to 1.1 percentage points.

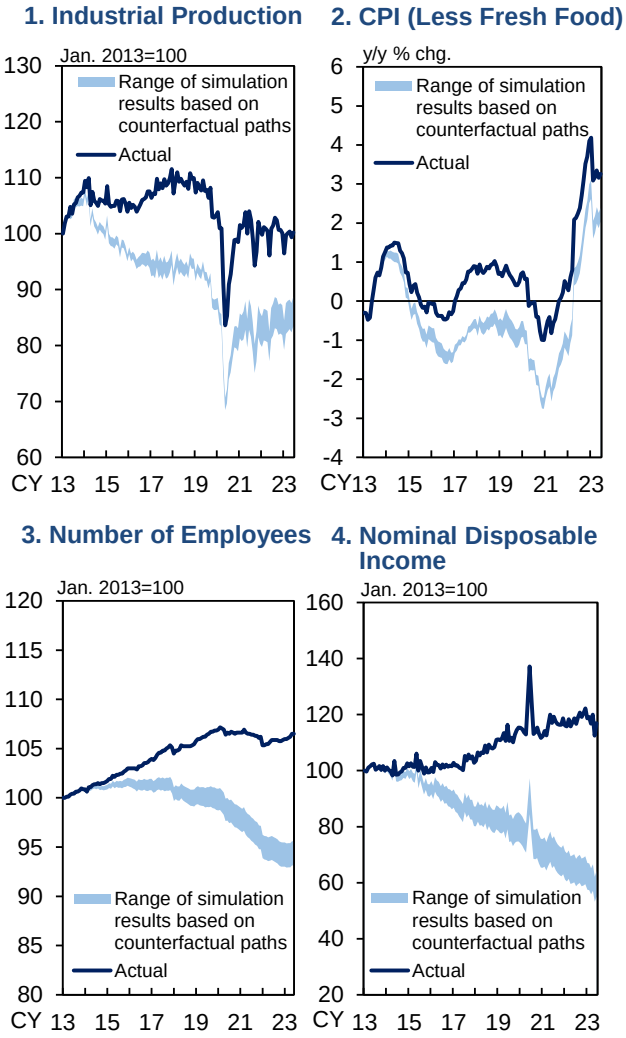
Chart 1-3-13: Decomposition of the Simulation Results



Source: Haba et al. (2024b).
Notes: 1. The CPI figures are staff estimates and exclude the effects of consumption tax hikes, policies concerning the provision of free education, and travel subsidy programs.
2. The figures show the average policy effects for 2013/Q2-2019/Q4. The real GDP figures show the deviation from the actual level, and the CPI figures the deviation from the actual inflation rate. The charts show the results of the simulations that produced the largest policy effects out of the 16 simulations.

Although the results of both counterfactual simulations need to be interpreted with considerable latitude, it can be assessed that the large-scale monetary easing since 2013 has pushed up economic activity and prices to some extent, and has thereby contributed to moving Japan's economy out of a state of deflation.

Chart 1-3-14: Assessments of Policy Effects Using the Time-Series (FAVAR) Model



Sources: Bloomberg; Consensus Economics Inc., "Consensus Forecasts"; Ministry of Economy, Trade and Industry; Ministry of Health, Labour and Welfare; Ministry of Internal Affairs and Communications.
Note: The CPI figures are staff estimates and exclude the effects of consumption tax hikes.

Background to Why It Took Time to Achieve the Price Stability Target of 2 Percent

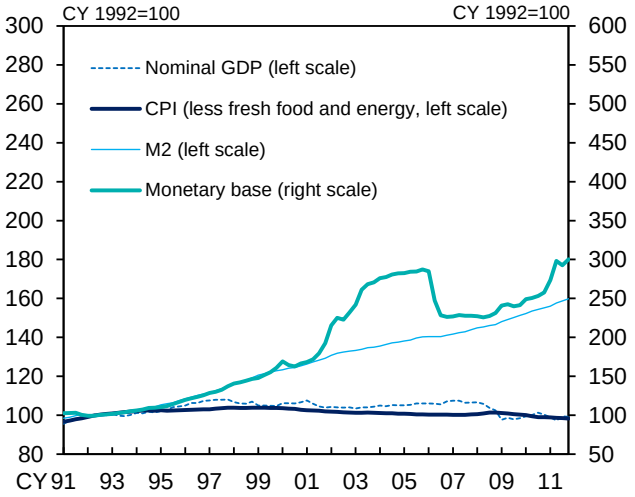
When QQE was first introduced in 2013, the Bank aimed to achieve the price stability target of 2 percent at the earliest possible time, with a time horizon of about two years. However, the two model-based analyses suggest that while the large-scale monetary easing did push up economic activity and prices, actual average inflation from fiscal 2013 to fiscal 2019 was only 0.5 percent based on the CPI less fresh food and 0.6 percent based on the CPI less fresh food and energy.[26] In other words, while the large-scale monetary easing was effective to some extent, the effect was not as large as initially expected. Meanwhile, there was no link between money (money stock, monetary base) and prices or nominal GDP as assumed by the simple quantity theory of money (Chart 1-3-15).

One of the major factors why large-scale monetary easing was not as effective as initially expected is that, according to the analyses above, it was not easy to influence expectations. In other words, in Japan, adaptive expectations have had a strong influence on the formation of inflation expectations. Under these circumstances, inflation expectations, after rising for a while following the introduction of QQE in 2013, subsequently declined again reflecting the sharp drop in crude oil prices. More fundamentally, the behavior and mindset based on the assumption that wages and prices will not increase easily had become deeply entrenched due to the experience of prolonged deflation, and it took time for this to change even as economic activity improved substantially.

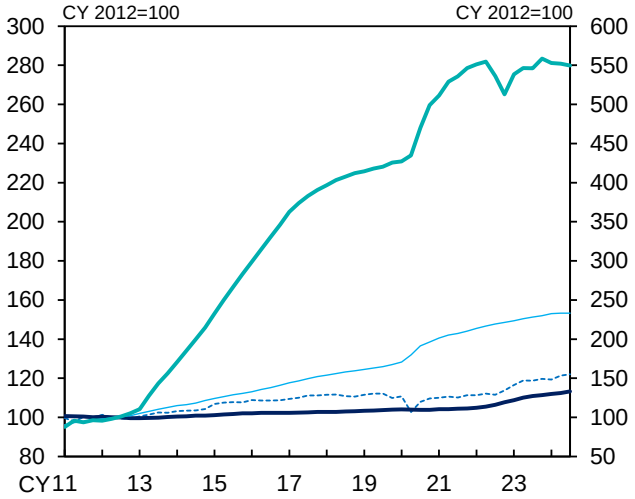
[26] The CPI figures are staff estimates and exclude mobile phone charges and the effects of consumption tax hikes, policies concerning the provision of free education, and travel subsidy programs.

Chart 1-3-15: Money, Prices, and Nominal GDP

1. Before CY 2012



2. From CY 2011



Sources: Ministry of Internal Affairs and Communications; Cabinet Office; Bank of Japan.
Notes: 1. The CPI figures are staff estimates and exclude mobile phone charges and the effects of consumption tax hikes, policies concerning the provision of free education, and travel subsidy programs.
2. Figures are seasonally adjusted.

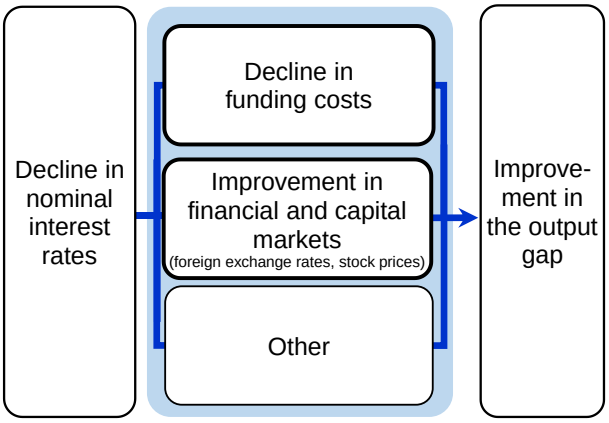
Transmission Channels of Monetary Easing

The analyses using Q-JEM and FAVAR assume that monetary easing affects economic activity and prices through various channels, although the extent to which these channels are explicitly specified in the models differs.

To examine the transmission channels more closely, Chart 1-3-16 presents the results of an additional analysis providing a decomposition of the transmission channels of monetary easing using a VAR model. The results of this analysis and the analysis using Q-JEM (Charts 1-3-12 and 1-3-13) suggest that the decline in interest rates had an impact on economic activity and prices not only through funding costs, but also through financial and capital markets, such as developments in stock prices and exchange rates. It should be noted, however, that the interaction between monetary policy and developments in stock prices and exchange rates varies substantially over time and is highly uncertain. Looking at Japan's financial structure, while indirect financing through banks continues to be the main source, there are also signs of an expansion of the role of asset markets, and these changes may be altering the transmission channels of monetary policy.

Chart 1-3-16: Transmission Channel of the Decline in Interest Rates

1. Overview



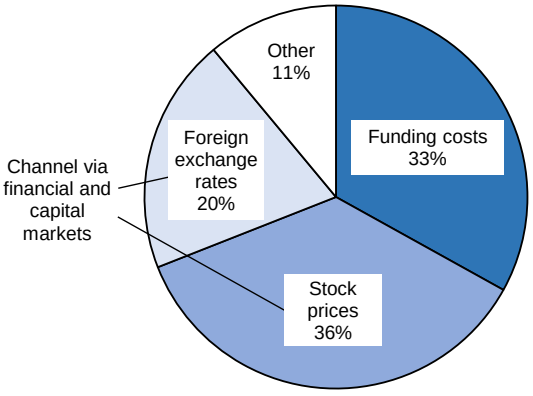
2. Model

A VAR model with coefficient restrictions using eight variables is estimated. The variables are:

1. Output gap, 2. Interest rates (3-month),
3. Interest rate spread (2-year minus 3-month),
4. Interest rate spread (5-year minus 2-year),
5. Interest rate spread (10-year minus 5-year),
6. Aggregate funding costs,
7. Nominal effective exchange rate of the yen,
8. Stock prices

Estimation period: 1998/Q1-2019/Q4. Lag order: 1.
Calculated as the 5-year cumulative impact on the output gap.

3. Improvement in the Output Gap through the Decline in Interest Rates by Channel



Sources: Bank of Japan; Bloomberg, etc.
Note: Aggregate funding costs are the weighted average of bank lending rates and issuance yields for CP and corporate bonds. Figures in the pie chart show the 5-year cumulative effects.

D. Impact of Large-Scale Monetary Easing on Market Functioning, the Functioning of Financial Intermediation, and the Growth Potential

It has been argued that large-scale monetary easing has had an impact on the functioning of financial markets and financial intermediation, as well as on the growth potential of Japan's economy (the supply side of the economy). This section examines these issues.

Impact on the Functioning of Financial Markets

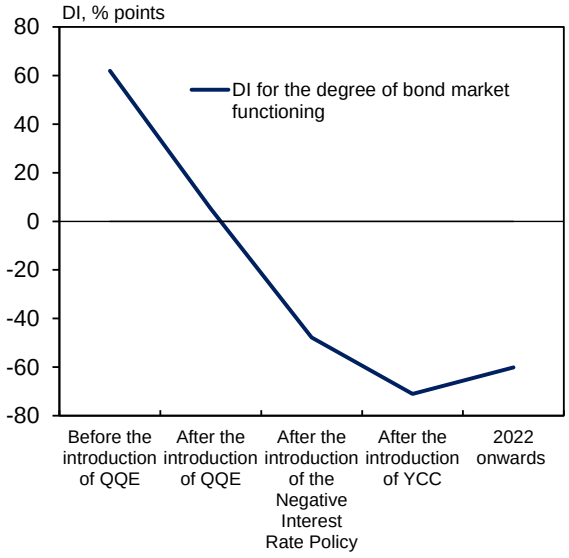
To start with, the impact on the functioning of the JGB market is examined. The Bank has recognized that large-scale JGB purchases and YCC can affect the functioning of the JGB market. From this perspective, the Bank has from time to time modified the way various measures are implemented, such as the Securities Lending Facility to Provide the Markets with a Secondary Source of Japanese Government Securities, to maintain the functioning of the market, and has also modified its operations of YCC in response to economic activity, prices, and financial conditions at the time (Chart 1-4-1). However, even under these circumstances, the *Bond Market Survey* indicated that market participants assessed that the degree of functioning of the JGB market had declined substantially with the large-scale JGB purchases by the Bank and the introduction of the Negative Interest Rate Policy and YCC framework since 2016 (Charts 1-4-2, 1-4-3, and 1-4-4).

Chart 1-4-1: Functioning of the JGB Market: Market Operations Modifications by the Bank

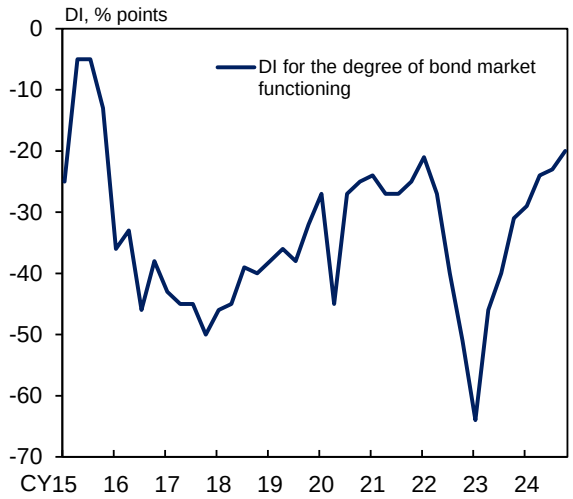
April 2013	・Began to release the schedule for outright purchases of JGBs ・Relaxed the terms and conditions for the Securities Lending Facility (SLF) (reduction of the minimum fee rate, abolition of the upper limit to the total amount of sales per day)
June 2013	・Changed the pace of outright purchases of JGBs (increased the frequency of purchases while reducing the amount of purchases per auction)
April 2014	・Operational changes to the SLF (additional offer in the morning)
October 2014	・Began to release the schedule for outright purchases of JGBs on a monthly basis
March 2015	・Relaxed the terms and conditions for the SLF (increase in the upper limit to the amount of sales, extension of the number of business days counterparties are permitted to consecutively purchase the same issue)
December 2015	・Relaxed the terms and conditions for the SLF (extension of the number of business days counterparties are permitted to consecutively purchase the same issue)
February 2017	・Began to release the specific dates of auctions for outright purchases of JGBs in advance
April 2019	・Relaxed the terms and conditions for the SLF (reduction of the minimum fee rate, abolition of the upper limit on the amount of sales per issue, relaxation of conditions for the reduction in the amount of cheapest to deliver (CTD) issues repurchased by the Bank)
April 2021	・Began to indicate a fixed offer amount instead of indicating a range
June 2021	・Began to release the schedule for outright purchases of JGBs on a quarterly basis
June 2022	・Relaxed the terms and conditions for the SLF for CTD issues
December 2022	・Began to indicate an offer amount in the form of a range instead of indicating a fixed amount
February 2023	・Introduced measures concerning the SLF for three on-the-run issues of 10-year JGBs
October 2024	・Clarified that the relaxed terms and conditions for the SLF for CTD issues would remain in place (including the terms for the reduction in the amount of CTD issues repurchased by the Bank)

Chart 1-4-2: Bond Market Functioning

1. Bond Market Functioning by Phase

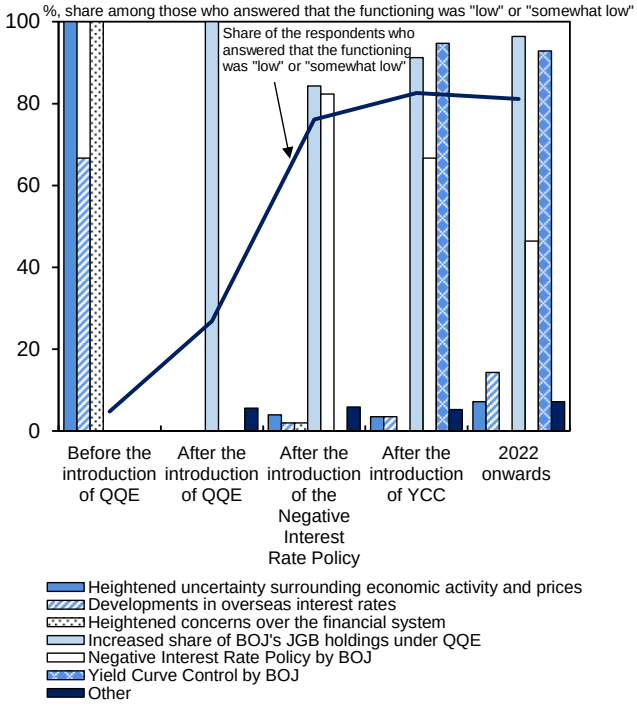


2. Bond Market Functioning by Time Period



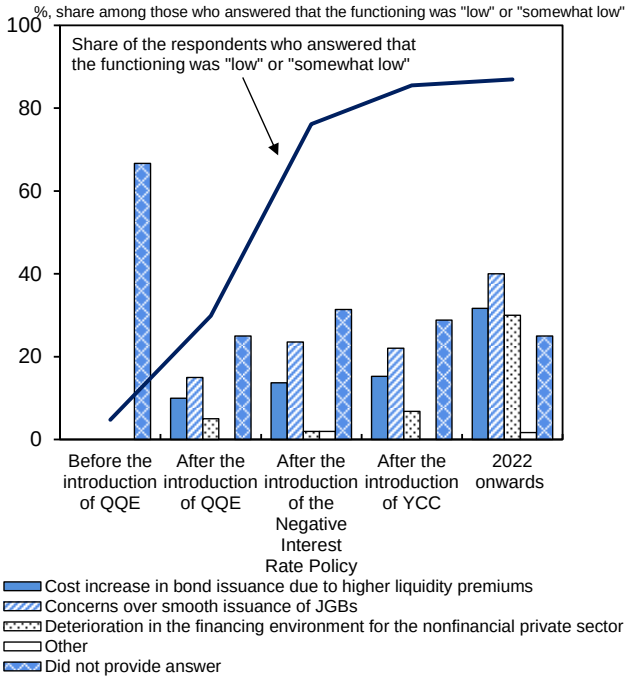
Source: Bank of Japan.
Notes: Figures for panel 1 are based on the results of the special survey (November 2023) of the *Bond Market Survey*. Figures for panel 2 are based on the results of regular surveys of the *Bond Market Survey*.

Chart 1-4-3: Factors in the Decline in Bond Market Functioning



Source: Bank of Japan.
Note: Based on the results of the special survey (November 2023) of the *Bond Market Survey*.

Chart 1-4-4: Impact of the Decline in Bond Market Functioning

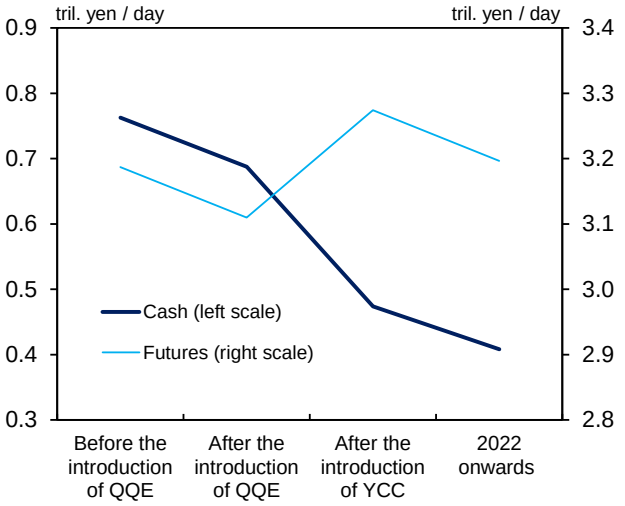


Source: Bank of Japan.
Note: Based on the results of the special survey (November 2023) of the *Bond Market Survey*.

To gauge this issue from a quantitative perspective, Charts 1-4-5, 1-4-6, and 1-4-7 examine the impact of large-scale monetary easing on market functioning based on liquidity indicators (transaction volumes and bid-ask spreads) and relative price indicators (yield curve distortion).[27] Using JGB issue-level panel data, the analysis shows that (1) JGB purchases by the Bank increased transaction volume, while the Bank's increased holdings of JGBs and the conduct of continuous fixed-rate purchase operations decreased transaction volume (however, when large-scale purchases were prolonged and the Bank's share of JGB holdings exceeded a certain threshold, JGB purchases also reduced transaction volume); (2) while JGB purchases reduced bid-ask spreads, an increase in the Bank's share of JGB holdings resulted in a nonlinear widening in bid-ask spreads; and (3) an increase in the Bank's share of holdings of a certain JGB issue and the conduct of continuous fixed-rate purchase operations led to distortions in the yield curve. Moreover, since 2022, when the effect of YCC in terms of suppressing long-term interest rates became more pronounced, the decline in the functioning of the JGB market appears to have spilled over into the functioning of the corporate bond market and affected the volatility of other financial markets.

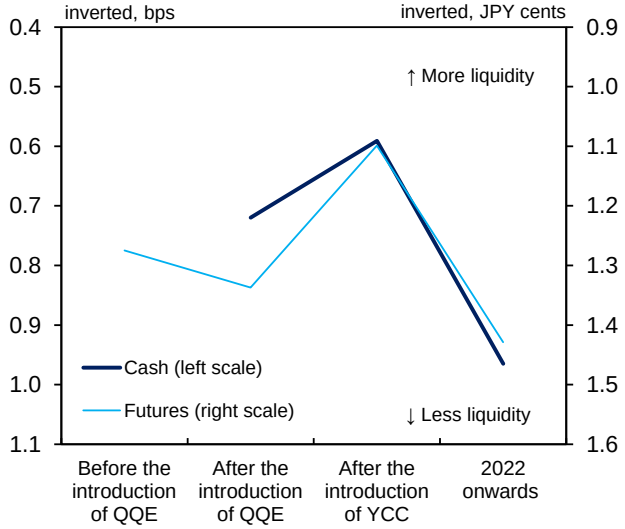
Meanwhile, looking at the impact on the degree of functioning of short-term money markets shows that under the Quantitative Easing Policy from 2001 to 2006, financial institutions' incentives to trade declined, resulting in a low level of amounts outstanding in the uncollateralized call market and other markets (Chart 1-4-8).[28] On the other hand,

Chart 1-4-5: JGB Transaction Volume



Sources: QUICK; Japan Bond Trading; Osaka Stock Exchange, Inc.
Notes: 1. Figures are period averages (before the introduction of QQE: January 2012 to March 2013; after the introduction of QQE: April 2013 to September 2016; after the introduction of YCC: October 2016 to December 2021; 2022 onwards: January 2022 to January 2024).
2. Figures for the transaction volume in the cash market are the total daily transaction volume (inter-dealer transactions) in 2-, 5-, 10-, 20-, 30-, and 40-year bonds.

Chart 1-4-6: Bid-Ask Spreads of JGBs



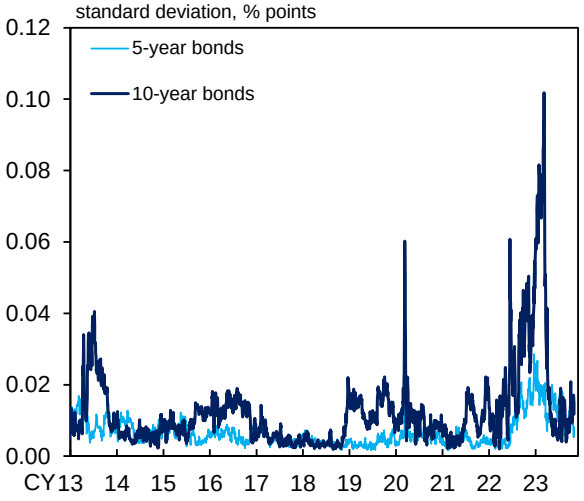
Sources: Japan Bond Trading; Nikkei Inc., "Nikkei NEEDS."
Notes: 1. Figures are period averages (before the introduction of QQE: January 2012 to March 2013; after the introduction of QQE: April 2013 to September 2016; after the introduction of YCC: October 2016 to December 2021; 2022 onwards: January 2022 to January 2024).
2. Figures for the cash market are the average of bid-ask spreads at a 1-second frequency for on-the-run 10-year bonds (inter-dealer transactions). Figures for the futures market are the average of the widest 10 percent of bid-ask spreads at a 1-minute frequency.

[27] For details on the impact of large-scale monetary easing on the functioning of the bond market, see Appendix 11.

[28] For details on developments in and the degree of functioning of short-term money markets under large-scale

under large-scale monetary easing, the Complementary Deposit Facility introduced in 2008 created an incentive for financial institutions eligible to receive interest under this facility to trade with those that were not eligible, and transaction volumes in the uncollateralized call market and other markets were maintained to a certain extent. In addition, following the introduction of the Negative Interest Rate Policy in 2016, trading became more active under the three-tier system for current accounts at the Bank, resulting in an expansion of the trading network in the uncollateralized call market and a substantial increase in the amount outstanding. Moreover, the results of surveys of market participants also indicate that transactions in short-term money markets became more active under the three-tier system (Chart 1-4-9).

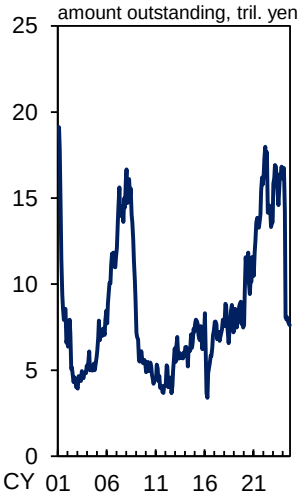
Chart 1-4-7: Distortions in the JGB Yield Curve



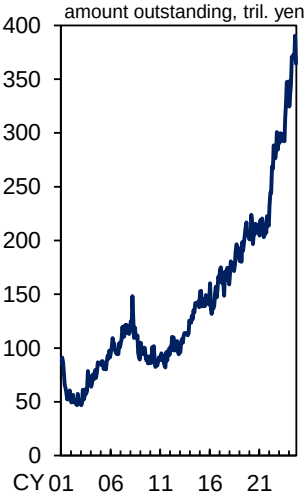
Source: Japan Securities Dealers Association.
Note: The chart shows the standard deviation between the yield curve smoothed with a cubic spline and the actual market yield. "5-year bonds" refers to bonds with a remaining maturity of 3.5-5.5 years, while "10-year bonds" refers to bonds with a remaining maturity of 7-10.5 years.

Chart 1-4-8: Amount Outstanding in the Money Market

1. Uncollateralized Call Market



2. Repo Market

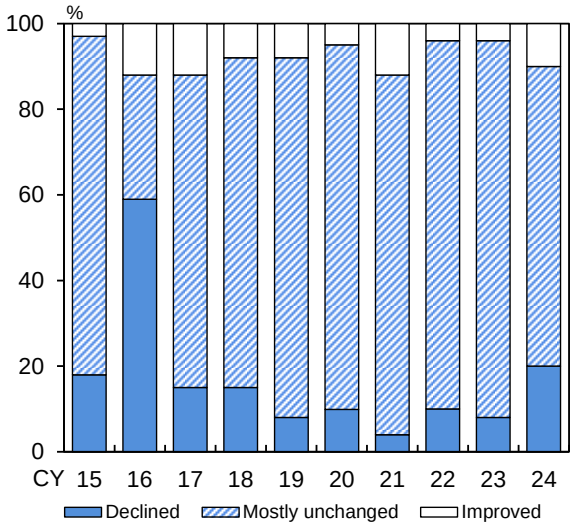


Sources: Bank of Japan; Japan Securities Dealers Association.
Note: Figures for amount outstanding in the repo market are the sum of securities lending with cash collateral and securities sales with repurchase agreements.

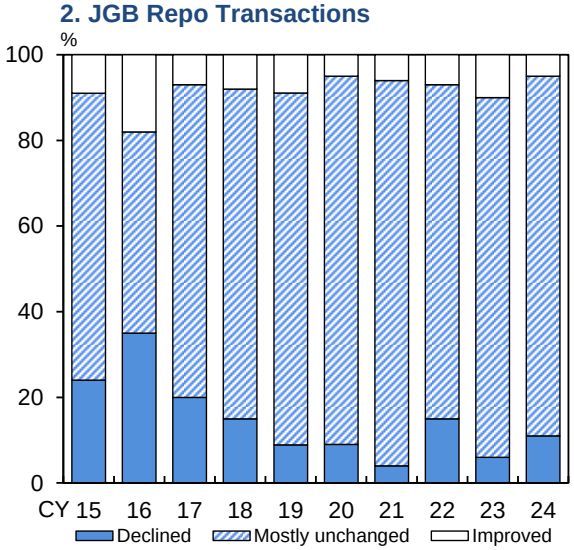
monetary easing, see Appendix 12.

Chart 1-4-9: Market Participants' Perceptions with Regard to Changes in Market Functioning

1. Uncollateralized Call Transactions



2. JGB Repo Transactions



Source: Bank of Japan.
Note: Figures are based on results of the *Tokyo Money Market Survey*.

Impact on the Functioning of Financial Intermediation

Next, the impact on the functioning of financial intermediation is examined. The decline in interest rates resulting from large-scale monetary easing increased corporate demand for funds through improvements in the economy (Charts 1-4-10 and 1-4-11). For financial institutions responding to the funding demand, the decline in interest rates has exerted downward pressure on their profits by reducing interest margins on loans and securities, while the rise in asset prices and lower credit risk have enhanced their capital (Chart 1-4-12).[29,30]

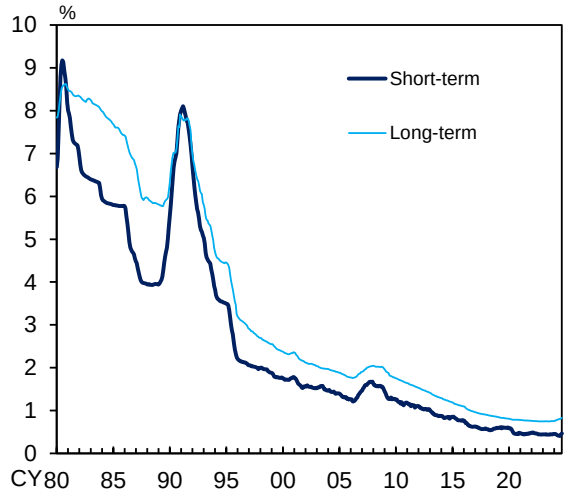
In order to assess the impact of monetary easing on the functioning of financial intermediation taking all these effects into account, the Bank's Financial Macro-econometric Model (FMM) was used to examine the impact on banks' finances and risk-taking capacity through counterfactual simulations based on a hypothetical situation assuming the absence of large-scale monetary easing.[31] The simulations show that as a result of the decline in interest rates caused by large-scale monetary easing, (1) lending margins were lower

[29] Although improvements in valuation gains/losses on securities holdings resulting from rising asset prices are not included in the calculation of domestic banks' capital adequacy ratios, they increase their room for realizing gains and therefore can help to boost their profits and capital through an increase in realized gains on securities holdings.

[30] Meanwhile, the Bank introduced the Special Deposit Facility to Enhance the Resilience of the Regional Financial System as a policy to ensure the stability of the financial system, with the aim of helping to strengthen the business foundations of regional financial institutions so that they can continue to firmly support regional economies and smoothly perform their financial intermediation function in the future, and paid additional interest on current accounts at the Bank to regional financial institutions that met certain requirements (a three-year temporary measure implemented from fiscal 2020 to fiscal 2022).

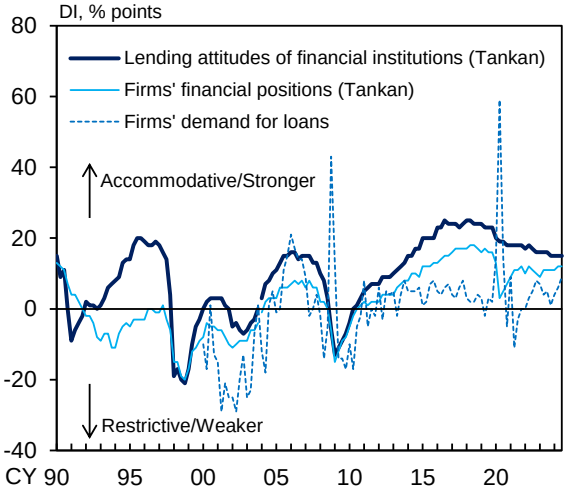
[31] For a detailed analysis of the impact of the Bank's large-scale monetary easing on the functioning of financial intermediation using the FMM, see Appendix 13.

Chart 1-4-10: Bank Lending Rates



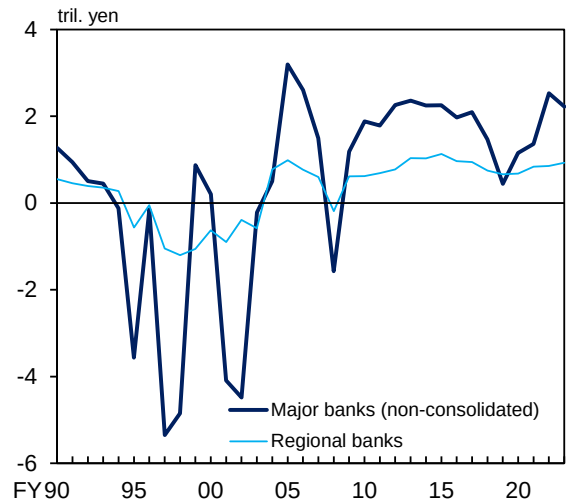
Source: Bank of Japan.
Note: Figures are for the outstanding loans of domestically licensed banks.

Chart 1-4-11: Lending Attitudes of Financial Institutions and Firms' Financial Positions and Demand for Loans



Source: Bank of Japan.
Notes: 1. There is a discontinuity in the *Tankan* data for December 2003 due to a change in the survey framework.
2. The data source for "Firms' demand for loans" is the *Senior Loan Officer Opinion Survey on Bank Lending Practices at Large Japanese Banks*.

Chart 1-4-12: Net Income of Banks



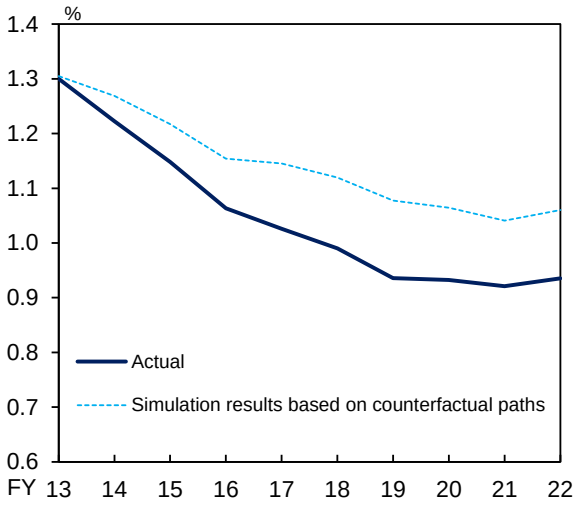
Source: Bank of Japan.

than they would have otherwise been while the amount of loans outstanding was larger, and (2) there was no significant difference in terms of banks' capital adequacy ratios, indicating that risk-taking capacity was maintained (Chart 1-4-13). The simulation results further suggest that, in addition to low interest rates and improvements in the economy, improved collateral values resulting from stable land prices also contributed to an increase in lending. Thus, there is no evidence that large-scale monetary easing has impeded financial intermediation through a mechanism such as that discussed in the "reversal rate" argument, according to which interest rate cuts may lead to a more restrictive lending stance by financial institutions due to a squeeze on their profits.

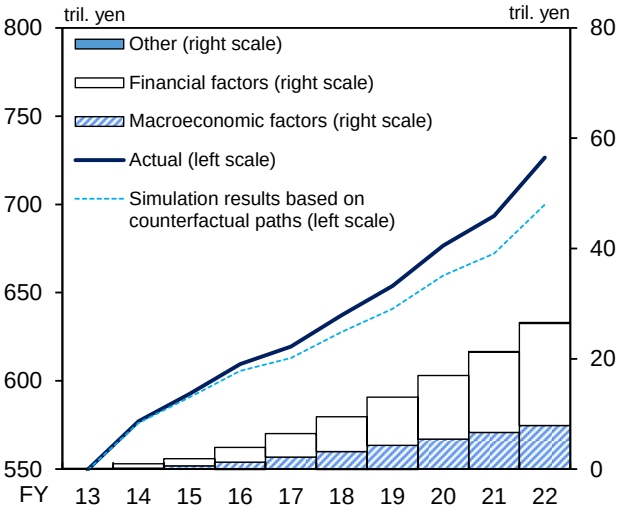
On the other hand, even under the prolonged accommodative financial environment, the pace of lending growth was not significantly excessive relative to economic activity, except for the period immediately following the outbreak of COVID-19. This is likely due to structural changes in loan demand, such as (1) a decline in firms' demand for external funding as firms became net savers, and (2) a decline in the number of firms due to the declining population and an increase in *de facto* debt-free firms. Meanwhile, from the perspective of the financial cycle, too, there have been no signs of a buildup of major financial imbalances (Charts 1-4-14 and 1-4-15).

Chart 1-4-13: Assessments of Policy Effects Using the FMM

1. Lending Margin

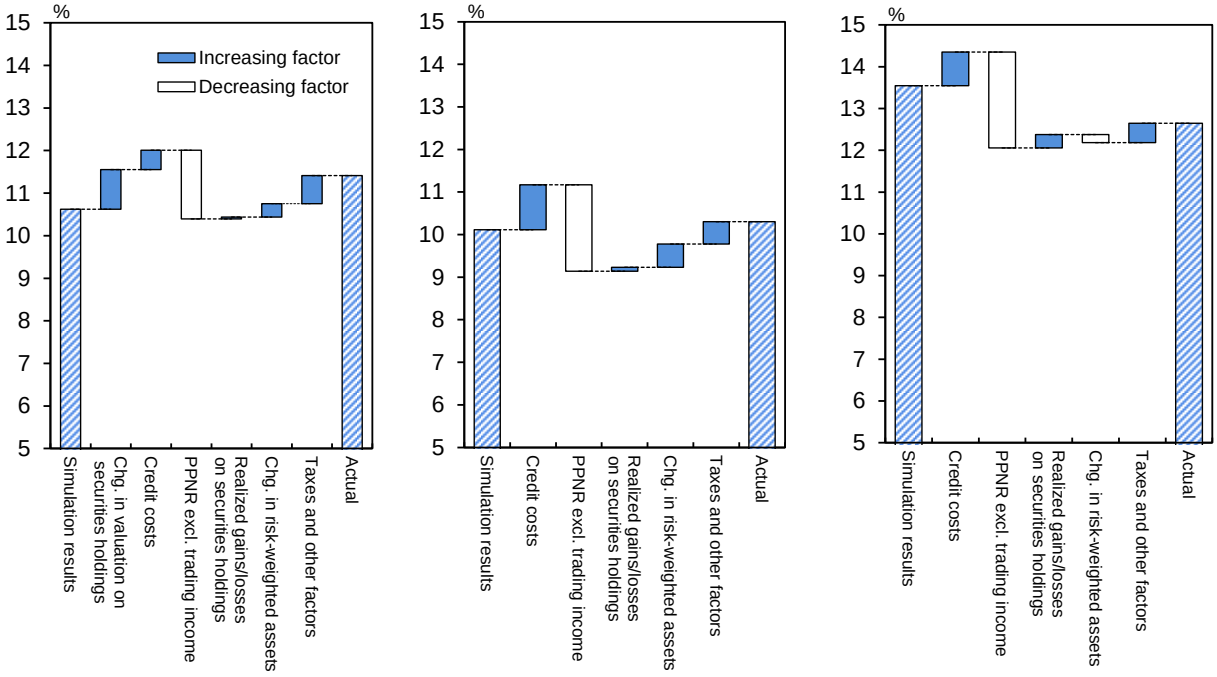


2. Loans Outstanding



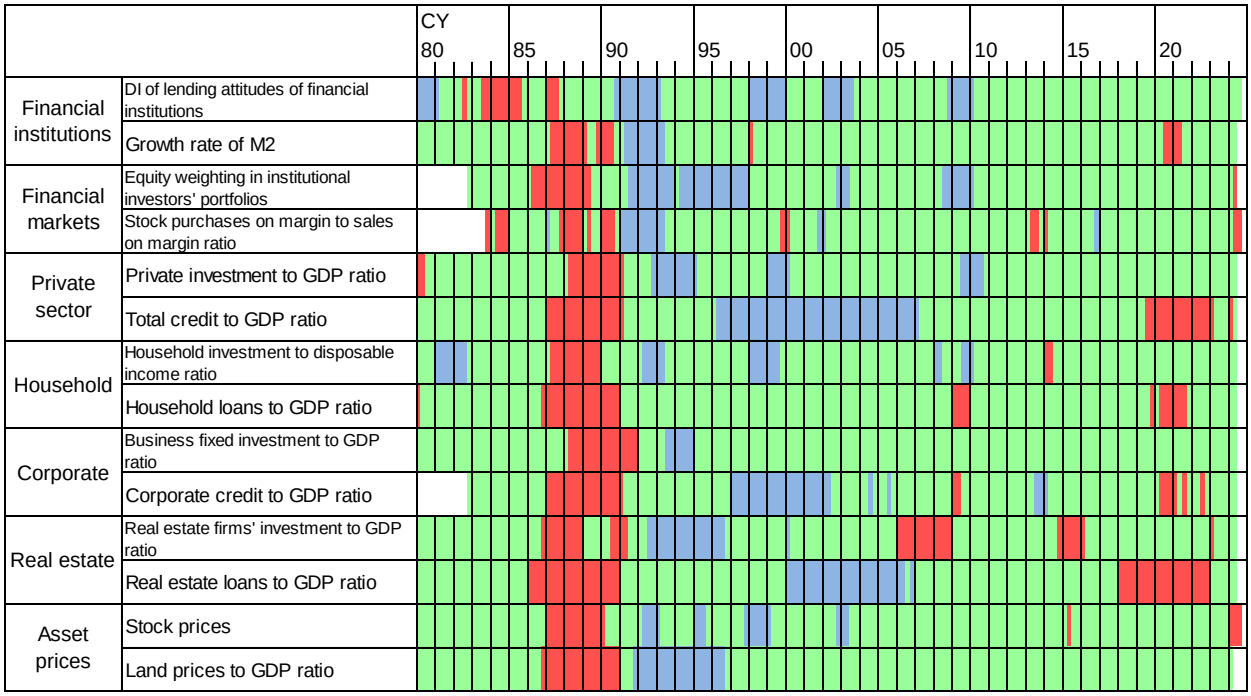
3. Capital Adequacy Ratios

(1) Internationally Active Banks **(2) Domestic Banks (excl. *Shinkin*)** **(3) Domestic *Shinkin* Banks**



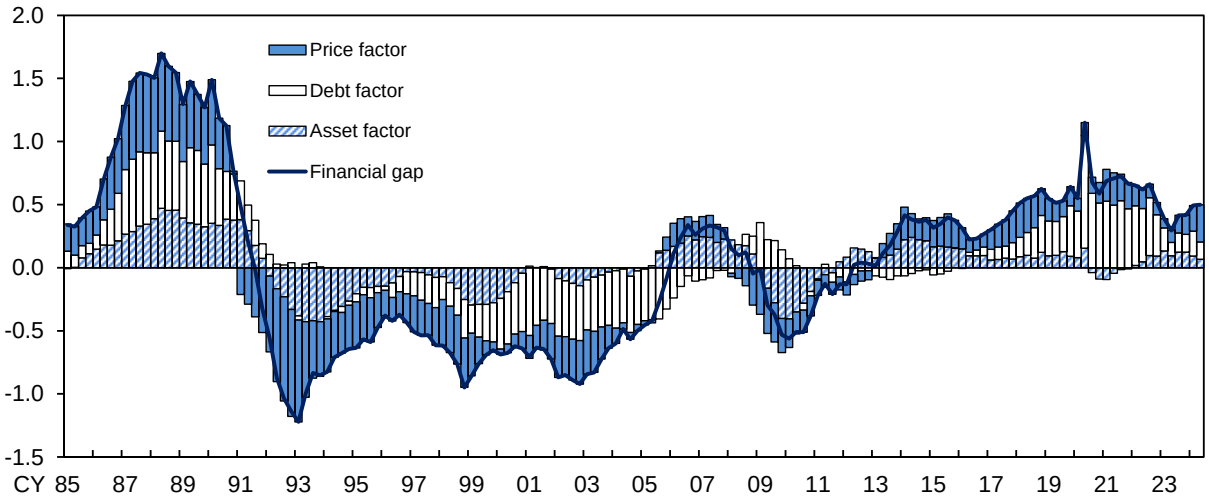
Sources: Bank of Japan; Abe et al. (2024).
Notes: 1. In panel 1, the lending margin is calculated as lending rates minus funding rates.
2. Panel 2 shows actual and counterfactual loans outstanding and the contribution of each factor to the difference between them. "Financial factors" include the effects of lending rates, land prices, and banks' financial conditions. "Macroeconomic factors" include the effects of the output gap and population.
3. Panel 3 shows the contribution of each factor to the difference between the actual and counterfactual capital adequacy ratios at the end of the simulation period (fiscal 2022).
4. See Abe et al. (2024) for details of the counterfactual simulation.

Chart 1-4-14: Financial Activity Indexes (Heat Map)



Sources: Bank of Japan; Bloomberg; Cabinet Office; Japan Real Estate Institute; Ministry of Finance; Tokyo Stock Exchange.
Note: For details, see the Bank's *Financial System Report* (October 2024).

Chart 1-4-15: Financial Gap



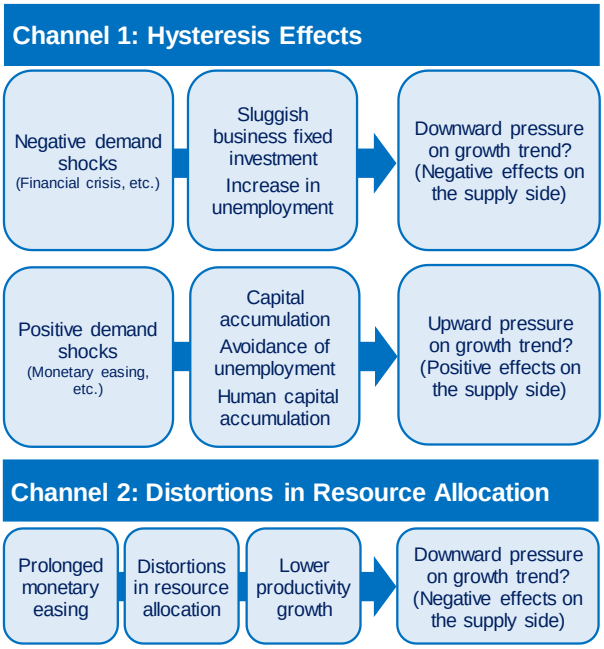
Source: Bank of Japan.
Note: For details, see the Bank's *Financial System Report* (October 2024).

Impact on the Supply Side of the Economy

Standard frameworks in economics usually assume that monetary easing works on the demand side of the economy via a decline in real interest rates, and often do not consider medium- to long-term impacts on the supply side of the economy, such as productivity and the potential growth rate. However, the demand and supply sides of the economy are closely related, and especially if monetary easing continues for a long period of time, monetary policy may have an impact on the supply side of the economy in the medium- to long-term.[32]

Academics often highlight two transmission channels through which prolonged monetary easing can affect the supply side of the economy (Chart 1-4-16). The first is hysteresis effects, i.e., the impact of the business cycle on the growth trend. For example, it is well known that large-scale negative demand shocks caused by events such as a financial crisis can have a negative impact on the supply side of the economy through sluggish business fixed investment and increased unemployment. Conversely, if the economy receives a lasting boost by a positive demand shock due to large-scale monetary easing, there may be positive hysteresis effects on the supply side of the economy through capital accumulation and human capital accumulation as a result of the avoidance of unemployment. This idea is sometimes called a "high-pressure economy."[33]

Chart 1-4-16: Potential Effects of Monetary Easing on the Supply Side: Summary of Studies



[32] It is important to note that changes on the supply side of the economy also have an impact on the effects of monetary easing and the demand side of the economy through changes in the natural rate of interest, etc. If productivity improves and the potential growth rate increases as a result of a combination of efforts by firms and various government measures – which will also put upward pressure on the natural rate of interest – this will likely help to increase the effectiveness of monetary easing.

[33] See, for example, Yellen (2016).

The second transmission channel through which prolonged monetary easing can affect the supply side of the economy is distortions in resource allocation and adverse effects on productivity growth. Specifically, the possibility that in a low interest rate environment low-productivity firms survive rather than exit the market is often pointed out.

Empirical analyses of the impact of monetary easing on the supply side of the economy – at least based on currently available data – have reached no clear conclusion, either positive or negative.

To examine these issues in more detail, Chart 1-4-17, using macroeconomic data and certain assumptions, presents the results of estimating the impact of monetary easing on potential GDP and its components – potential capital and labor input and total factor productivity – employing two different statistical models. The analysis suggests that while monetary easing tends to lead to an accumulation of potential capital input over the long term, the statistical significance of the impact on potential labor input and total factor productivity differed depending on the model. Similarly, the significance of the impact of monetary easing on total potential GDP, which is the sum of these effects, differed depending on the model, while the estimates of the impulse response indicate that the effect may have been only slightly positive.[34]

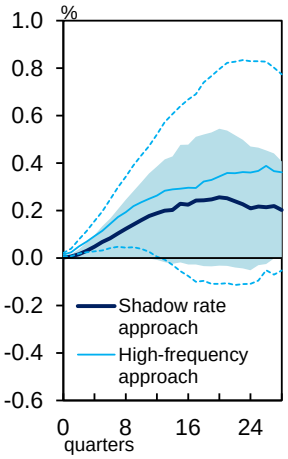
Chart 1-4-17: Effects of Monetary Policy Shocks

1. Analytical Framework

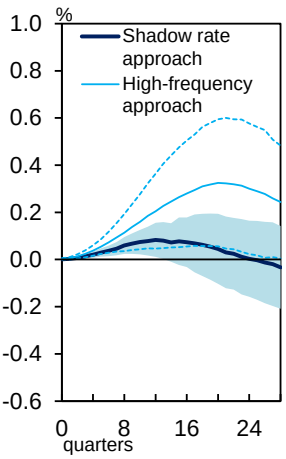
- Monetary policy shocks in Japan are identified using two approaches: one based on the shadow rate and another using high-frequency data.
- The impact of identified monetary policy shocks on potential GDP, potential labor input, potential capital input, and total factor productivity (TFP) is estimated using the local projections method.

2. Estimation Results

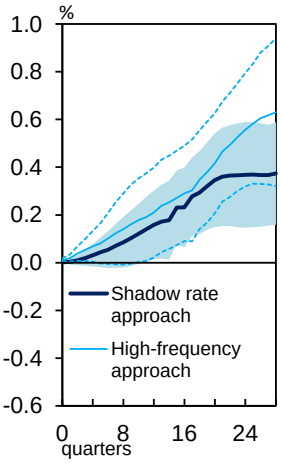
(1) Potential GDP



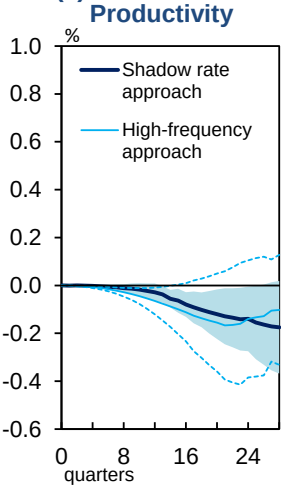
(2) Potential Labor Input



(3) Potential Capital Input



(4) Total Factor Productivity



Sources: Ministry of Economy, Trade and Industry; Ministry of Internal Affairs and Communications; Cabinet Office; Bank of Japan; Bloomberg; Consensus Economics Inc., "Consensus Forecasts"; QUICK.
Note: The panels present the cumulative impulse responses to a 1 standard deviation monetary easing shock, and show the percentage deviation from the pre-shock level. The shaded areas and dotted lines denote 90 percent confidence intervals.

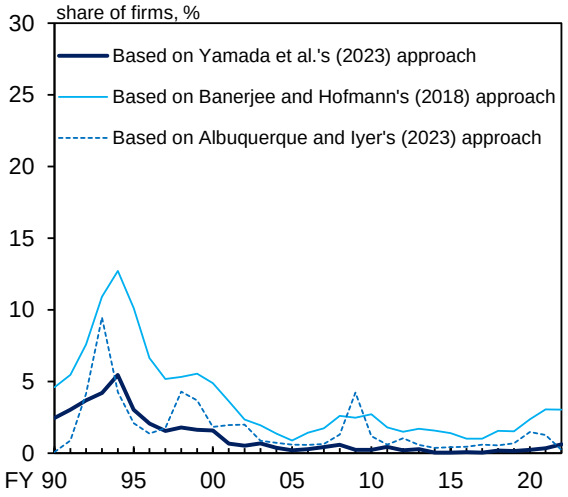
Yellen, Janet L. (2016), "Macroeconomic Research after the Crisis," Speech at the 60th Annual Economic Conference Sponsored by the Federal Reserve Bank of Boston.

[34] For details on the impact of monetary easing on the supply side of the economy, including productivity, see Appendix 14.

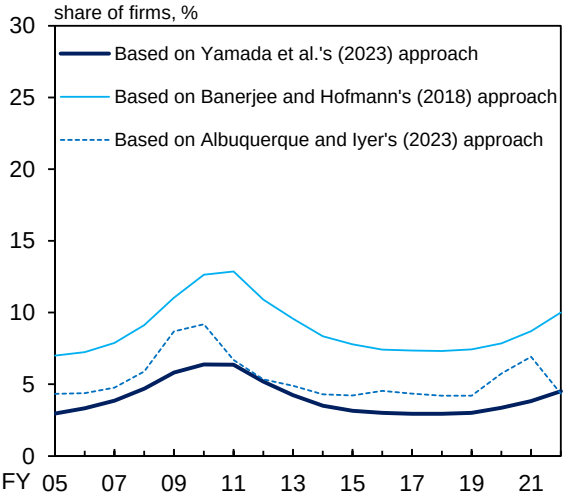
Next, looking at firm-level microdata, the impact of the low interest rate environment on productivity is also unclear. The proportion of large firms classified under certain criteria as "surviving with support from banks or other entities despite performing poorly with no prospect of recovery" declined through the mid-2000s and has remained at a low level since then (Chart 1-4-18). This suggests that even under large-scale monetary easing, the number of firms that are surviving only thanks to financial support from banks has not increased.

Chart 1-4-18: Firms that Survive with Support from Banks or Other Entities despite Performing Poorly with No Prospect of Recovery

1. Large Firms



2. Small and Medium-Sized Firms

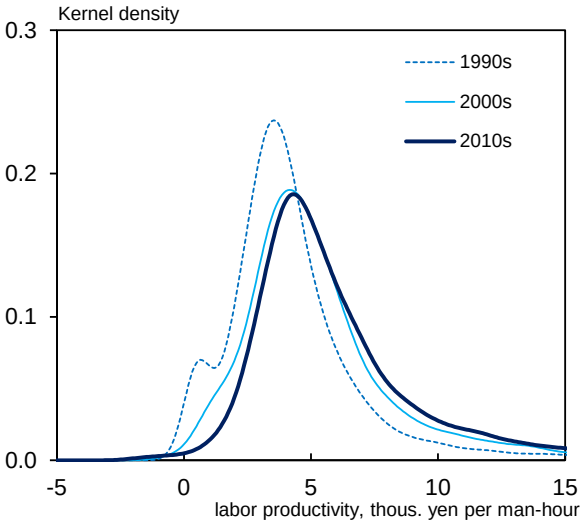


Sources: Bank of Japan; Development Bank of Japan, "Corporate Financial Databank"; CRD Association.
Note: For details, see Makabe and Yagi (2024).

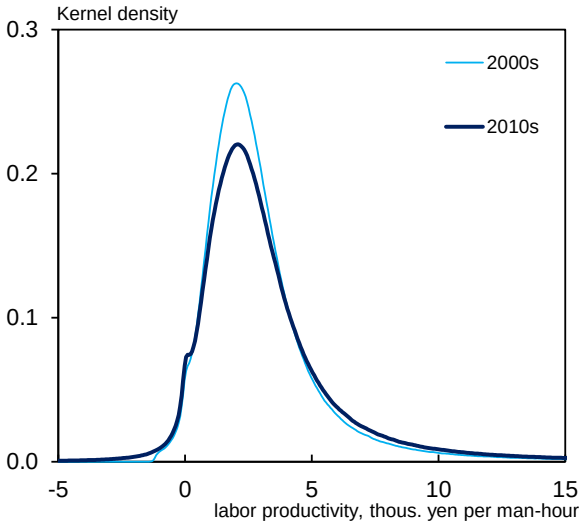
On the other hand, among large firms, the variation in productivity across firms has widened over the past 25 years, suggesting that there are a fair number of firms whose productivity remains low (Chart 1-4-19). Among small and medium-sized firms, there is also a fair degree of variation in productivity across firms. However, it is difficult to identify the impact of the continued low interest rate environment as the reason for the survival of low-productivity firms, given that studies have also highlighted the role of various structural factors in the labor market and the existence of a variety of policy support measures.

Chart 1-4-19: Distribution of Labor Productivity of Individual Firms

1. Large Firms



2. Small and Medium-Sized Firms



Sources: Cabinet Office; Development Bank of Japan, "Corporate Financial Databank"; CRD Association.
Note: For details, see Makabe and Yagi (2024).

E. Assessment of the Effects and Side Effects of Large-Scale Monetary Easing

As argued above, the large-scale monetary easing since 2013 did not have as large an upward effect on prices as originally expected, partly because it was not easy to influence expectations. However, based on the analyses, it can be assessed that the large-scale monetary easing to some degree had a positive effect on economic activity and prices. In addition, the prolonged large-scale monetary easing has been having the effect of pushing up the level of economic activity and, together with demographic changes, contributing to tight labor market conditions, so that when import prices started to rise substantially at the start of the 2020s, firms' wage and price-setting behavior changed and the linkage between wages and prices increased.

In terms of the side effects of the large-scale monetary easing, quantitative analyses at this point indicate that these policies had a negative impact on the functioning of the JGB market. However, surveys show that market participants' assessment of the degree of functioning of the JGB market has been improving, partly due to the revision of the framework for large-scale monetary easing. In addition, although large-scale monetary easing led to a contraction of financial institutions' lending margins, there is no evidence at this point that it has impeded financial intermediation activities. Moreover, no clear conclusions have been reached regarding the impact on the supply side of the economy, either positive or negative.

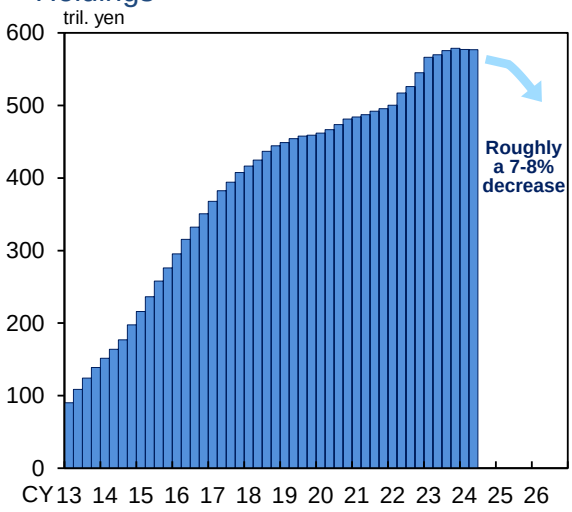
The assessment of the effects and side effects of large-scale monetary easing is as follows. Although there have been certain side effects on financial markets and financial institutions' profits, the overall effect on the Japanese economy so far appears to have been positive. However, attention

should be paid to the possibility that the negative effects may become larger in the future, such as the possibility that the functioning of the JGB market does not fully recover or possible side effects of large-scale monetary easing materialize at a later date.

That is, even with the Bank reducing new purchases of JGBs, its JGB holdings are expected to remain extremely large for some time (Chart 1-5-1). Under these circumstances, it may take a period of time for the functioning of the JGB market to recover. In this context, it is worth noting that surveys of market participants indicate that the business of their domestic bond market divisions has been shrinking, and it has been pointed out that it may take a fair amount of time for resources devoted to such business to recover (Chart 1-5-2).

Moreover, firms' and households' borrowing behavior and financial institutions' risk-taking attitudes under large-scale monetary easing may affect financial intermediation activities in the future. There are indications that some of the increased in lending amid the secular decline in corporate borrowing demand, intensified competition among financial institutions, and low interest rate environment contains loans to borrowers with relatively low resilience to a decline in income or increase in loan interest rates as well as a concentration of loans in certain industries such as real estate (Chart 1-5-3). In addition, borrowing terms for firms and households have been getting longer, while the duration of bonds held by financial institutions has also been getting longer, resulting in an increase in interest rate risk (Chart 1-5-4). Although financial institutions' profitability has recently begun to improve, from a somewhat longer-run perspective it has been deteriorating, so that some financial institutions' resilience to stress has declined (Chart 1-5-5).

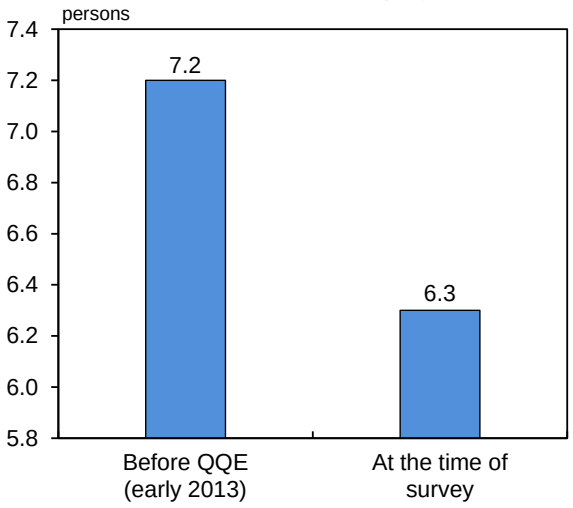
Chart 1-5-1: The Bank of Japan's JGB Holdings



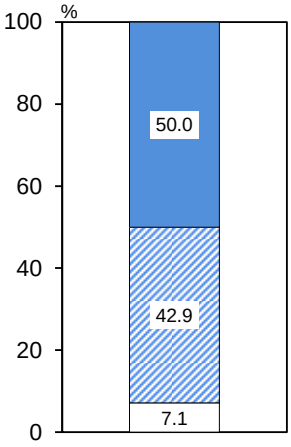
Source: Bank of Japan.

Chart 1-5-2: Allocation of Resources for JGB Trading Business

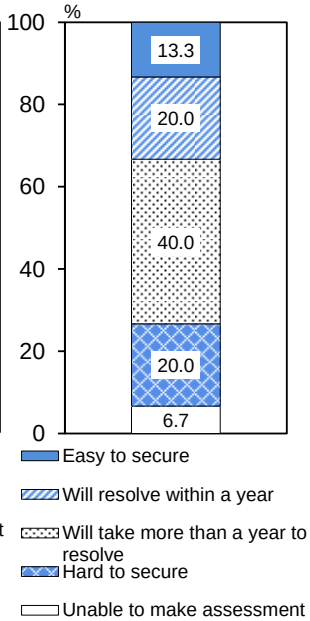
1. Number of Front-Office Employees



2. Sufficiency of Current Resources



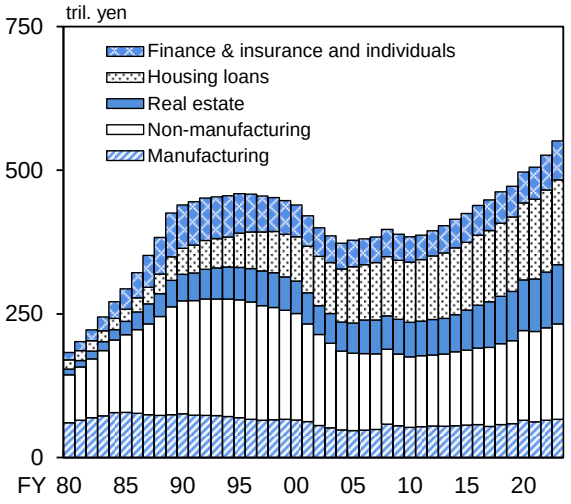
3. Possibility of Securing Enough Resources



Source: Bank of Japan.
Notes: 1. Figures show the results of the special survey (November 2023) of the *Bond Market Survey*.
2. Figures in the bottom charts show the responses in terms of human resources. In the right-hand chart, figures are for those who selected "Insufficient" in the left-hand chart.

Meanwhile, whereas the profitability and financial robustness of some firms that increased their borrowing have improved, there has also been a certain share of firms that have continued to experience weak profitability. These points could be factors that impede financial intermediation activities in the event of a significant change in the external environment, going forward.

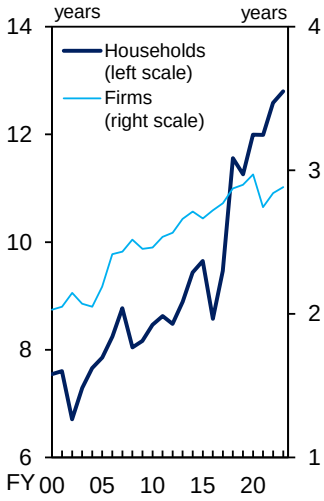
Chart 1-5-3: Loans Outstanding



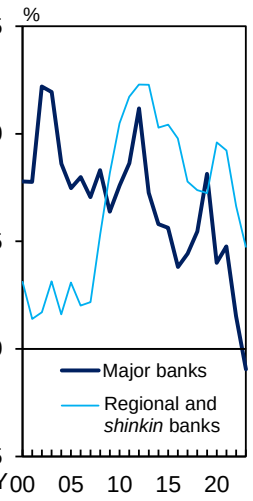
Source: Bank of Japan.
Note: Figures for "Finance & insurance and individuals" exclude housing loans, and figures for "Non-manufacturing" exclude real estate and finance and insurance.

Chart 1-5-4: Interest Rate Risk of Firms, Households, and Banks

1. Borrowing Term of Firms and Households

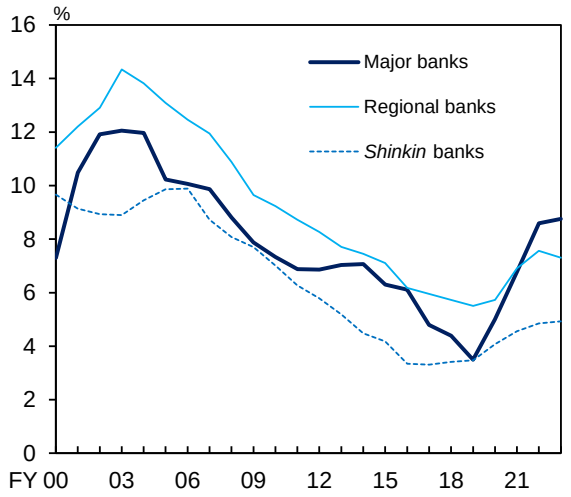


2. Interest Rate Risk of Banks



Sources: Bank of Japan; Japan Housing Finance Agency; Ministry of Finance.
Notes: 1. Figures in the left-hand chart are based on staff estimates.
2. Figures in the right-hand chart are the interest rate risk in the banking book (yen interest rate risk in terms of 100 BPV, as a ratio to capital). Figures before fiscal 2018 are based on staff estimates.

Chart 1-5-5: PPNR ROE



Source: Bank of Japan.
Note: Figures are based on pre-provision net revenue (PPNR) excluding trading income and, from fiscal 2012, excluding profits and losses from investment trusts due to cancellations.

II. Implications for the Future Conduct of Monetary Policy

A. The Bank's Thinking on Unconventional Monetary Policy

The various unconventional monetary policy measures the Bank implemented were effective in pushing up Japan's economic activity and prices. However, the quantitative degree of the effects of the unconventional measures are uncertain compared with conventional monetary policy measures, which are conducted by guiding short-term interest rates. Moreover, when such unconventional measures are implemented at a large scale for a long period of time, they could bring about side effects on the functioning of financial markets and the profits of financial institutions.

Thus, it is necessary to bear in mind that, while unconventional monetary policy measures may be an important option in the face of the zero lower bound on interest rates, they cannot fully substitute for conventional monetary policy measures that control short-term interest rates. Going forward, if it becomes necessary to implement unconventional monetary policy measures, it will be important to weigh the benefits and costs of unconventional measures, while taking account of the developments in economic activity and prices as well as financial conditions at that point in time.

In addition, unconventional monetary policy measures accompanied by balance sheet expansions have the potential to impact central bank finances in the phase of monetary tightening. In this regard, under a fiat money system, confidence in the currency is not directly ensured by the assets held by a central bank or its financial soundness, but by the appropriate conduct of monetary policy with the aim of achieving price

stability. Based on this premise, central banks are generally set up in such a way that they secure profits from a somewhat longer-term perspective and, moreover, can supply their own means of payment and settlement. Therefore, even if a central bank temporarily makes losses or has negative equity, this does not impede its ability to conduct monetary policy. However, this does not mean that the central bank can run up unlimited losses and negative equity. If the central bank's financial risks become a matter of undue attention and give rise to unnecessary confusion over monetary policy, there is a risk that this could lead to a decline in its credibility. Therefore, ensuring the soundness of the central bank's finances is important.[35]

B. Price Stability Target of 2 Percent

Given that unconventional monetary policy measures cannot fully substitute for conventional monetary policy measures (guiding short-term interest rates), it is desirable to conduct monetary policy so that the zero lower bound would not be reached. From this perspective, it is important to maintain a moderate positive inflation rate in a stable manner so that real interest rates can be lowered in the case of an economic downturn. Moreover, although the bias in the CPI seems to be decreasing on the whole, it continues to serve as supporting evidence for central banks that they should aim for a positive inflation rate.[36] These

Chart 2-2-1: Inflation Targets of Major Advanced Economies

Country/ area	Name/ price indicator	Numerical value/ period
Japan	Price Stability Target CPI	2% Earliest possible time
United States	Longer-Run Goal PCE price index	2% Longer-run
Euro area	Inflation Target HICP	2% Medium term
United Kingdom	Inflation Target CPI	2% Medium term
Canada	Inflation-Control Target CPI	2% Typically 6 to 8 quarters
Australia	Inflation Target CPI	2-3% Medium term
New Zealand	Inflation Target CPI	Near 2% Medium term
Sweden	Inflation Target CPIF	2% ——
Norway	Inflation Target CPI	2% Over time
Switzerland	Definition of Price Stability CPI	A rise in the CPI of less than 2% Medium and long term

Note: For Canada and New Zealand, the target rate is the midpoint of a range of 1-3%.

[35] For the relationship between central bank finances and monetary policy conduct, see Bank of Japan Monetary Affairs Department (2023).

Bank of Japan Monetary Affairs Department (2023), "Central Bank Finances and Monetary Policy Conduct," Bank of Japan Research Paper.

[36] For an overview of the recent situation and issues surrounding measurement errors in the CPI, see Kobayashi et al. (2024).

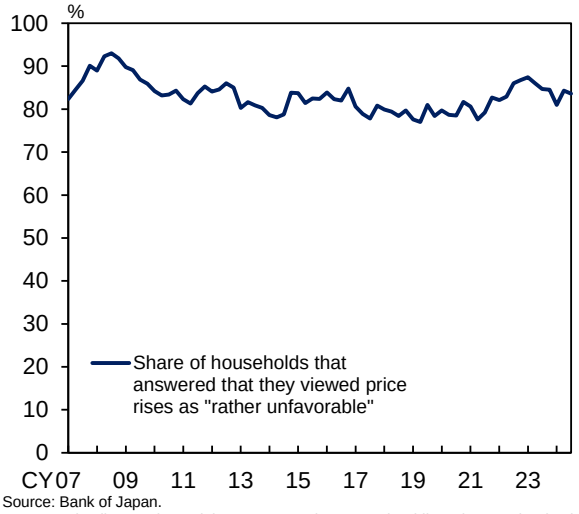
Kobayashi, Satoshi, Takeshi Shinohara, Shigenori Shiratsuka, Nao Sudo, and Itofumi Takeuchi (2024),

views are shared by central banks in major advanced economies, many of which have set their inflation targets at 2 percent (Chart 2-2-1). It is also widely recognized that, in conducting monetary policy, it is important not to focus on the inflation rate at each point in time, but rather to capture the underlying trend of inflation by analyzing a variety of factors affecting the price changes.

Considering the above, it is appropriate for the Bank to continue to conduct monetary policy from the perspective of sustainable and stable achievement of the price stability target of 2 percent.

Meanwhile, in the *Opinion Survey on the General Public's Views and Behavior*, although most households responded that they considered the price rise alone as "rather unfavorable," many of them preferred "prices and income both rising moderately" over "prices and income both remaining almost the same" (Charts 2-2-2 and 2-2-3(1)). In the *Survey regarding Corporate Behavior since the Mid-1990s,* many firms responded that, in terms of their business activities, "a state in which both prices and wages rise moderately" is preferable (Chart 2-2-3(2)). In fact, when Japan was under the prolonged deflation, or in a low-inflation environment, prices of many items became more rigid and the regular pay tended to be unchanged. Such a situation may have distorted resource allocation or have constrained proactive investment by firms, while theoretical and empirical research needs to be further accumulated to confirm this.[37] Based on

Chart 2-2-2: Households' View on Price Rises



Source: Bank of Japan.
Note: For details, see the *Opinion Survey on the General Public's Views and Behavior*.

"Measurement Errors in the Consumer Price Index: Perspectives on Numerical Targets for Price Stability in Major Economies," IMES Discussion Paper Series, No.2024-E-16, Institute for Monetary and Economic Studies, Bank of Japan.

[37] See Appendix 15 for households' and firms' views on

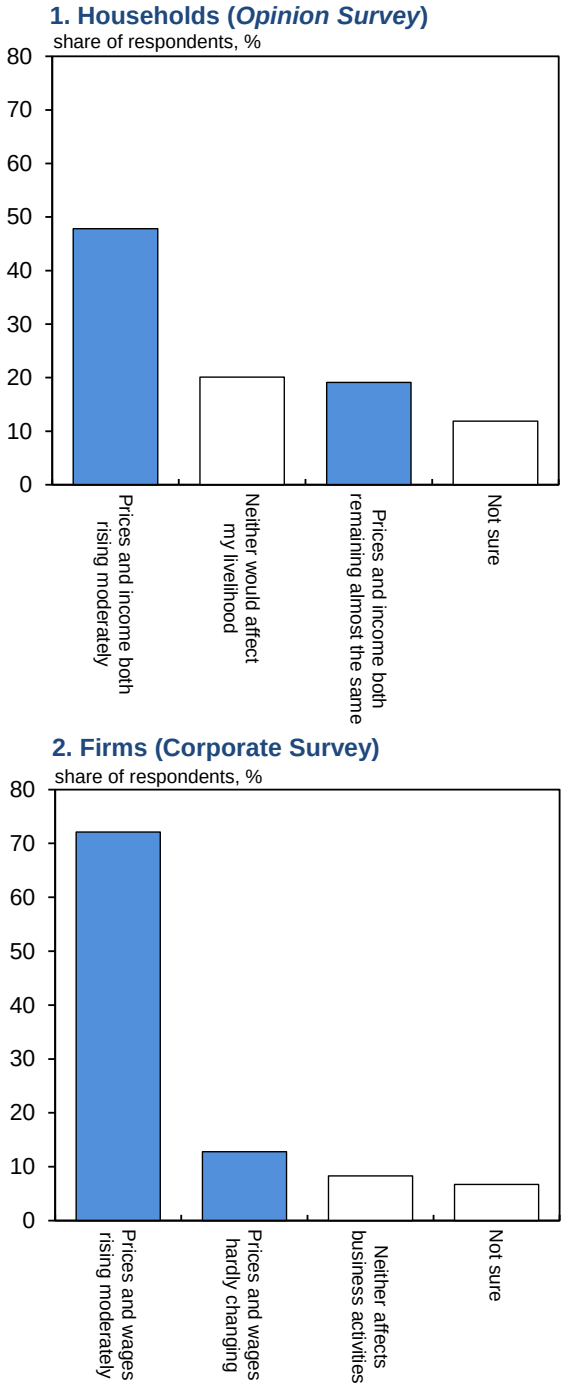
these experiences, it is necessary to achieve a moderate rise in prices accompanied by wage increases.

C. Fiscal and Monetary Policy

Both fiscal and monetary policies are important macroeconomic policy measures that have a significant impact on aggregate demand, and the transmission channels and effects of these policies interact with each other. This interaction has been widely discussed in academia.[38]

In these discussions, it has been pointed out that, theoretically, when monetary policy is faced with the effective lower bound on nominal interest rates, a policy mix of fiscal and monetary policy tends to be more effective – in other words, the fiscal multiplier increases. In this regard, there are many views that the global enhancement of monetary easing and expansion in fiscal spending following the Global Financial Crisis in particular were effective against the economic downturns at that time. That said, empirical analyses on this point have not been accumulated sufficiently because the periods in which economies were faced with the effective lower bound on nominal interest rates have been limited on a global basis. Moreover, there have been various discussions on the large-scale fiscal policies implemented during the COVID-19 pandemic, in terms of their effects in supporting economic activities and, together with monetary policies at that time, their impact on

Chart 2-2-3: Preferences with Regard to Prices, Income, and Wages



Source: Bank of Japan.
Note: For details on panel 1 and 2, see the *Opinion Survey on the General Public's Views and Behavior* (September 2024 Survey) and the *Survey regarding Corporate Behavior since the Mid-1990s*, respectively.

moderate price increases and a review of academic discussions on the issue of optimal price increases.

[38] For details on recent academic discussions regarding the interaction between fiscal and monetary policy, see Katagiri et al. (2024a).

Katagiri, Mitsuru, Yusuke Oh, Yasutaka Ogawa, Nao Sudo, and Takeki Sunakawa (2024a), "On the Interaction between Monetary and Fiscal Policy: Developments in Macroeconomics since the Global Financial Crisis," IMES Discussion Paper Series, No.2024-E-12, Institute for Monetary and Economic Studies, Bank of Japan.

subsequent price developments, particularly in the United States.[39]

In the workshops conducted and public comments collected as part of the Review, it was pointed out that the Bank's JGB purchases and the continued low interest rate environment under the large-scale monetary easing led to a loosening of fiscal discipline. The Bank has explained continuously and consistently that it implemented the large-scale monetary easing based on the need to conduct monetary policy, which aimed at achieving the price stability target of 2 percent. Going forward, in order to ensure confidence in the currency and to achieve price stability, it is crucial for the Bank to continue to clearly indicate that the aim of monetary policy is to achieve price stability and should not be to support monetary financing of government debt.

D. Issues regarding Individual Monetary Policy Measures

As explained, if it becomes necessary to implement unconventional monetary policy measures, it will be important to weigh both benefits and costs of each measure, while taking account of the developments in economic activity and prices as well as financial conditions at each point in time. In this regard, based on the discussions in the Review, the Bank should not exclude at this point any specific measures when considering the future conduct of monetary policy.

[39] As for discussions regarding price developments and fiscal policies in the United States since the COVID-19 pandemic, see, for example, Ball, Leigh, and Mishra (2022) and Bernanke and Blanchard (2024a).

Ball, Laurence M., Daniel Leigh, and Prachi Mishra (2022), "Understanding U.S. Inflation during the COVID Era," IMF Working Papers, No.2022/208.

Bernanke, Ben S. and Olivier J. Blanchard (2024a), "What Caused the U.S. Pandemic-Era Inflation?" *American Economic Journal: Macroeconomics*, forthcoming.

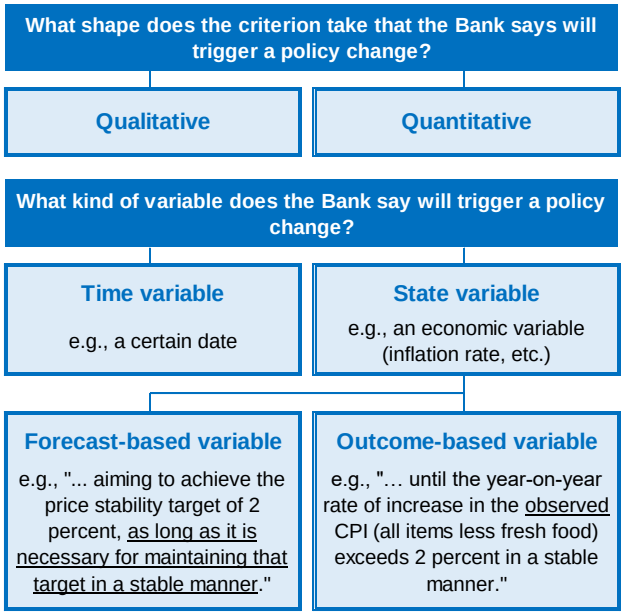
However, from the experience of conducting unconventional monetary policy including large-scale monetary easing, it has become increasingly clear that the effects of each measure entail uncertainties and that each measure has its own side effects and caveats. Looking ahead, in considering the implementation of unconventional monetary policy measures, it will be necessary for the Bank to design policy measures that can exert positive effects while minimizing side effects as much as possible, taking account of the findings of the Review. From this perspective, it is likely to be beneficial for the Bank to bear in mind points such as the following.

Forward Guidance

Forward guidance is a policy measure that can exert downward pressure on interest rates at the time of its adoption by making a "commitment" about the future course of monetary policy – for example, with an announcement that short-term interest rates will be kept at low levels. Central banks have adopted various forms of forward guidance in an attempt to make it more effective. The actual effect of forward guidance in pushing down interest rates has been reported in many research papers.[40]

The various forms of forward guidance can be roughly categorized in terms of whether the commitment about the future conduct of monetary policy is (1) "qualitative" or "quantitative" and (2) "time-contingent" – e.g., indicating a specific point in time as a trigger of policy changes – or "state-contingent" – e.g., implying that policy changes are conditioned on a specific state of economic

Chart 2-4-1: Form of Forward Guidance



[40] For details on the research trends in recent years, see, for example, Bernanke (2020).

Bernanke, Ben S. (2020), "The New Tools of Monetary Policy," *American Economic Review*, Vol.110(4), pp.943-983.

variables such as the inflation rate (Chart 2-4-1). Some studies in other countries report that "quantitative and state-contingent" forward guidance has been effective because it provides a clear commitment and is consistent with the fact that the appropriate timing of a policy change depends on developments in the economy at each point in time (Chart 2-4-2).[41] It should be noted, however, that the characteristics of "quantitative and state-contingent" forward guidance can differ significantly depending on whether the state included in the guidance is (a) forecast-based or (b) outcome-based. Moreover, some studies suggest that "time-contingent" forward guidance is easier for the public to understand, and thus "state-contingent" guidance is not always better.[42] While there are various forms of forward guidance as presented above, in general, the more explicit or stronger the commitment to the future course of monetary policy in the guidance, the greater the effect of holding down interest rates at the time of the adoption. Given this, outcome-based "quantitative" forward guidance could have a stronger effect. On the other hand, an excessively strong commitment could lead to delayed policy adjustments if risks that were not anticipated at the time of the adoption of forward guidance become more likely to materialize, considering that monetary policy transmission takes time.[43] In this

Chart 2-4-2: Related Studies on Forward Guidance

Bernanke (2022)

The qualitative guidance that the FRB adopted immediately after the global financial crisis was vague, so that it was not effective in persuading markets that rates would stay lower for longer.

Woodford (2013)

The optimal policy rate and the timing of policy changes depend on how the economy develops. The FRB's move away from date-based forward guidance has much to recommend it.

[41] For details, see, for example, Bernanke (2022) and Woodford (2013).

Bernanke, Ben S. (2022), *21st Century Monetary Policy: The Federal Reserve from the Great Inflation to COVID-19*, W. W. Norton and Company.

Woodford, Michael (2013), "Forward Guidance by Inflation-Targeting Central Banks," Department of Economics Discussion Paper Series, No.1314-15, Columbia University.

[42] See, for example, Bernanke (2020) mentioned above.

[43] For example, Orphanides (2023) argues that an excessively strong commitment may induce delays in policy adjustments when unexpected shocks emerge, citing the episodes of inflation hikes following the COVID-19 pandemic in the United States and Europe.

sense, it can be effective to allow enough flexibility in forward guidance to deal with changes in the outlook for economic activity and prices by, for example, designing the major guidance to be conditioned on forecasts. In addition, it should be noted that if a central bank makes a "commitment" that economic agents – such as market participants – do not believe, these agents will increasingly expect that the central bank may break the "commitment" in the future, which could prevent the effect of holding down interest rates (the "time-inconsistency" problem). If a central bank fails to fulfill its "commitment," its credibility can be affected.

Since the introduction of the Zero Interest Rate Policy in 1999, in the face of the effective lower bound on nominal interest rates, the Bank has adopted various forms of forward guidance, taking into account the issues presented above (Chart 2-4-3).

The forward guidance first introduced by the Bank under the Zero Interest Rate Policy in 1999 was "qualitative and state-contingent." Subsequently, the Bank adopted "quantitative and state-contingent" forward guidance under Quantitative Easing Policy from 2001 and QQE from 2013. While the guidance under Quantitative Easing Policy contained a strong "commitment" in the sense that the state on which the guidance was contingent was outcome-based, the rate of change in prices as a condition for the "exit" from monetary easing was set at or above zero percent. In the forward guidance regarding the future continuation of the QQE framework, the rate of change in prices as a condition for the "exit" was set at 2 percent, which is as high as the price

Chart 2-4-3: Forward Guidance of the Bank of Japan

Zero Interest Rate Policy

"Until deflationary pressures is dispelled, … the uncollateralized overnight call rate will be kept at virtually zero percent ..."

(Remarks at a press conference by Masaru Hayami, Governor of the Bank of Japan, April 1999)

Quantitative Easing Policy

"The new procedures (quantitative easing policy) continue until the CPI (excluding perishables) registers stably a zero percent or an increase year on year."

(Statement released after the MPM in March 2001)

Comprehensive Monetary Easing Policy

"The Bank confirms that it will maintain the virtually zero interest rate policy until it judges that price stability is in sight."

(Statement released after the MPM in October 2010)

"The Bank will pursue aggressive monetary easing, aiming to achieve the price stability target (of 2 percent), through a virtually zero interest rate policy and purchases of financial assets, as long as the Bank judges it appropriate to continue with each policy measure respectively."

(Statement released after the MPM in January 2013)

Quantitative and Qualitative Monetary Easing

"The Bank will continue with the quantitative and qualitative monetary easing, aiming to achieve the price stability target of 2 percent, as long as it is necessary for maintaining that target in a stable manner."

(Statement released after the MPM in April 2013)

"The Bank will continue expanding the monetary base until the year-on-year rate of increase in the observed CPI (all items less fresh food) exceeds the price stability target of 2 percent and stays above the target in a stable manner."

(Statement released after the MPM in September 2016)

Orphanides, Athanasios (2023), "The Forward Guidance Trap," IMES Discussion Paper Series, No.2023-E-6, Institute for Monetary and Economic Studies, Bank of Japan.

stability target. At the same time, the state on which this guidance was contingent was forecast-based, which ensured flexibility. The Inflation-Overshooting Commitment introduced in 2016 with the aim of strengthening the influence on expectations – specifically, inflation expectations – was a quite strong "commitment," given that the state on which it was contingent was outcome-based and the rate of change in prices as the condition for the "exit" was set at 2 percent. However, as this commitment was about the monetary base, it allowed the Bank to adjust the policy interest rates in response to economic activity, prices, and financial conditions.

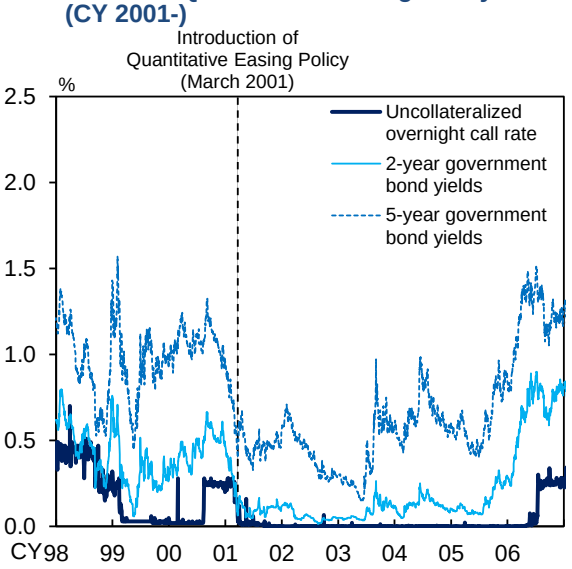
With these efforts in designing the guidance framework, the various forms of forward guidance implemented by the Bank seem to have produced their intended effects, such as lowering longer-term interest rates, and it appears that they did not cause a delay in policy adjustments.[44] Both in the period of quantitative monetary easing in the 2000s and the period of large-scale monetary easing after 2013, the policy duration effect of lowering short- to medium-term interest rates had been exerted until economic activity and prices satisfied the conditions for an "exit" (Chart 2-4-4). When adopting forward guidance, it is essential to consider the characteristics of forward guidance discussed above and design the guidance framework based on that, taking into account a wide range of scenarios.

JGB Purchases and Yield Curve Control

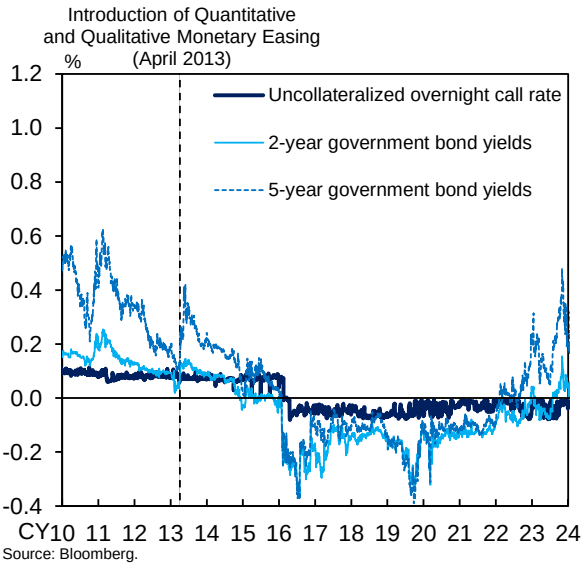
Large-scale JGB purchases including YCC, which is one form of large-scale JGB purchases, have been effective in terms of pushing down nominal interest rates substantially and pushing up

Chart 2-4-4: Effects of Forward Guidance

1. Period of Quantitative Easing Policy (CY 2001-)



2. Period of Quantitative and Qualitative Monetary Easing (CY 2013-)



Source: Bloomberg.

[44] However, as mentioned above, external communications including forward guidance in QQE have had less influence on inflation expectations than initially anticipated.

economic activity and prices as noted in Chapter I.

However, in considering the conduct of JGB purchases, a comprehensive perspective is required, which takes into account the side effects that are also pointed out in Chapter I. In particular, the impact of JGB purchases on the functioning of the JGB market and financial intermediation can vary depending on the duration for which the policy is continued. It is important to weigh the benefits and costs of the purchases by examining economic activity and prices as well as financial conditions at the time, taking account of the above perspective.

Negative Interest Rate Policy

The Negative Interest Rate Policy had the effects of both (1) lowering the entire yield curve by reducing expected future interest rates and (2) driving down long-term and super-long-term interest rates through the search for yield behavior among investors. As a result, this significant reduction in the yield curve provided a stimulus to economic activity and prices by lowering real interest rates.

At the same time, the introduction of a negative interest rate exerted downward pressure on financial institutions' interest margins. However, as mentioned in Chapter I, the impact of the Negative Interest Rate Policy on financial institutions' profits was mitigated by (1) institutional measures, such as the introduction of the three-tier system on current accounts at the Bank as well as (2) a decline in credit costs associated with economic improvement. This helped preserve financial institutions' capacity for risk taking. Furthermore, under conditions of significantly lower long-term and super-long-term interest rates, corporate funding continued to grow at a relatively high rate, supported by an increase in corporate bond

issuance. Thus, there is no evidence that the Negative Interest Rate Policy had impeded financial intermediation activities since its implementation in 2016.

Going forward, if the adoption of a negative interest rate policy is considered, it will be essential to weigh the potential benefits for economic activity and prices against the associated costs, particularly its impact on the functioning of financial intermediation. When designing a policy framework, it is necessary to include measures to mitigate side effects, such as the tier system introduced in 2016. Additionally, it is important to bear in mind that the longer a negative interest rate policy is maintained, the stronger its side effects may become.

Furthermore, given that the Negative Interest Rate Policy, in combination with forward guidance and large-scale JGB purchases, significantly influenced interest rate formation, the importance of policy combinations should also be recognized. An excessive decline in and flattening of the yield curve not only affect financial intermediation through banks but also may cause concerns about the sustainability of financial functions in a broader sense, as they reduce flexibility in designing insurance and pension products that are crucial for household asset formation. Such concerns could negatively impact economic activity by affecting sentiment, which is an issue that should also be considered carefully.

Lending Facility

The Bank has implemented various lending facilities over time, although not all are for pursuing monetary easing under the effective lower bound on nominal interest rates (Chart 2-4-5). These measures can be broadly categorized as follows: (1) measures to facilitate corporate

Chart 2-4-5: Lending Facilities

1. Facilitating Corporate Financing

	Date of introduction	Loans outstanding	
		At peak	As of end-October 2024
Special Funds-Supplying Operations to Facilitate Corporate Financing	December 2008 (abolished at the end of March 2010)	7.5 tril.yen (As of March 2009)	None
Special Funds-Supplying Operations to Facilitate Financing in Response to the Novel Coronavirus (COVID-19)	March 2020 (abolished at the end of March 2023)	86.8 tril.yen (As of March 2022)	None

2. Promoting Financial Institutions' Actions as well as Stimulating Firms' and Households' Demand for Credit

	Date of introduction	Loans outstanding	
		At peak	As of end-October 2024
Fund-Provisioning Measure to Stimulate Bank Lending Conducted through the Loan Support Program	December 2012	79.1 tril.yen (from June 2024 through August 2024)	78.4 tril.yen

3. Supporting Various Efforts in the Private Sector

	Date of introduction	Loans outstanding	
		At peak	As of end-October 2024
Fund-Provisioning Measure to Support Strengthening the Foundations for Economic Growth Conducted through the Loan Support Program	June 2010 (Loan disbursements ended at the end of June 2022)	7.0 tril.yen (from June 2018 through August 2018)	2.6 tril.yen
Funds-Supplying Operation to Support Financial Institutions in Disaster Areas	April 2011	0.7 tril.yen (from December 2018 through May 2019)	0.1 tril.yen
Funds-Supplying Operations to Support Financing for Climate Change Responses	September 2021	Current	12.0 tril.yen

Source: Bank of Japan.

financing, such as the Special Funds-Supplying Operations to Facilitate Corporate Financing and the Special Funds-Supplying Operations to Facilitate Financing in Response to the Novel Coronavirus (COVID-19); (2) measures to promote financial institutions' aggressive action and help increase proactive credit demand of firms and households, such as the Fund-Provisioning Measure to Stimulate Bank Lending; and (3) measures to support various private-sector initiatives from the perspective of achieving price stability over the medium to long term, including the Fund-Provisioning Measure to Support Strengthening the Foundations for Economic Growth, the Funds-Supplying Operation to Support Financial Institutions in Disaster Areas, and the Funds-Supplying Operations to Support Financing for Climate Change Responses.

Regarding the first category, the measures to facilitate corporate financing addressed the deterioration of corporate funding conditions and the surge in fund demand during crises such as the Global Financial Crisis and the COVID-19 pandemic. For example, the Special Funds-Supplying Operations to Facilitate Financing in Response to the Novel Coronavirus (COVID-19) provided incentives to promote financial institutions' initiatives by supplying back financing for the COVID-19 pandemic response loans under preferential conditions that involve applying interest on the balances of current accounts at the Bank. Since such measures are designed to provide strong incentives to financial institutions, they are ideally implemented as temporary and time-bound responses to urgent needs.

As for the second category, the measures to stimulate bank lending, are positioned as part of the monetary easing framework, with the aim of enhancing easing effects through the lending

channel. Given that financial intermediation in Japan continues to be based primarily on indirect financing, measures targeting the lending channel are still regarded as effective means of transmitting the effects of monetary easing to economic activity and prices.[45]

Regarding the third category, the measures to support various private-sector initiatives are implemented from the perspective of achieving price stability over the medium to long term, with specific objectives that vary depending on the operation. For example, the Funds-Supplying Operations to Support Financing for Climate Change Responses considers the significant potential impact of climate change on economic activity, prices, and financial conditions over the medium to long term. This operation is conducted based on the view that supporting the private sector's initiatives to address climate change from a central bank standpoint contributes to stability in the macroeconomy in the long run. The effectiveness of these measures should be assessed in relation to the Bank's mission of price stability and the specific objectives envisioned for each measure.

Purchase of Risk Assets

The Bank's purchases of risk assets have effectively reduced market instability by lowering risk premia.

The Bank's purchases of CP and corporate bonds have had a strong effect in restoring market

[45] Hirata, Ito, and Kasai (2024) conducted an analysis using loan data by individual banks, suggesting that the Fund-Provisioning Measure to Stimulate Bank Lending have a positive impact on bank lending.

Hirata, Atsuki, Yuichiro Ito, and Yoshiyasu Kasai (2024), "Impact of the Fund-Provisioning Measure to Stimulate Bank Lending in Japan," Bank of Japan Working Paper Series, No.24-E-24.

liquidity and reducing risk premia, when market liquidity and risk-taking capacity were severely dampened – especially in the aftermath of the Global Financial Crisis. Improvements in firms' funding conditions and investors' risk-taking capacity likely have a positive impact on the real economy.[46]

Regarding the purchases of assets such as ETFs, in the *Assessment for Further Effective and Sustainable Monetary Easing* (March 2021), the Bank showed that the effect of ETF purchases in reducing the risk premia is larger (1) the lower the level of stock prices relative to their trend at the time of purchases, (2) the higher the volatility in the stock market when stock prices are below their trend, (3) the larger the rate of decline in stock prices immediately before the conduct of purchases, and (4) the larger the size of purchases (Chart 2-4-6).[47] Lowering risk premia in financial markets, such as the stock market, likely has positively affected economic activity and prices by influencing asset prices and preventing

Chart 2-4-6: Estimation of the Effects of ETF Purchases

Estimation I:
Dependent variable (risk premium indicator)
= β × Control variables + θ × Purchase volume indicator

Estimation II:
Dependent variable (risk premium indicator)
= β × Control variables + F(Purchase effect function)
× Purchase volume indicator

F is a function with one of the following variables as a state variable:
1. the percentage downward deviation of stock prices from the trend
2. stock market volatility when stock prices are below their trend
3. the percentage decline in stock prices immediately before the purchases
4. the size of purchases

		Dependent variable (risk premia in the stock market)	
		Effects of ETF purchases on	
		… risk premia implied by option prices	… individual stock yield spreads
Estimation I		Yes	Yes
Estimation II	1. The lower the level of stock prices relative to their trend…	… the larger the effects.	… the larger the effects.
	2. The higher volatility in the stock market (when stock prices are below their trend)…	… the larger the effects.	… the larger the effects.
	3. The larger the rate of decline in stock prices immediately before the purchases…	No statistically significant effect.	… the larger the effects.
	4. The larger the size of purchases…	No statistically significant effect.	… the larger the effects.

Source: Bank of Japan.
Note: The estimation period is from December 2010 to December 2020. For details of the methodology, see *Assessment for Further Effective and Sustainable Monetary Easing*, released in March 2021.

[46] Hirose and Ohyama (2010), Suganuma and Ueno (2018), and Ochi and Osada (2023, 2024) examine the effect of the Bank's purchases of assets such as CP and corporate bonds.

Hirose, Yasuo and Shinsuke Ohyama (2010), "Identifying the Effect of the Bank of Japan's Liquidity Facilities: The Case of Commercial Paper Operations during the Financial Turmoil," *International Finance*, Vol.13(3), pp.461-483.

Suganuma, Kenji and Yoichi Ueno (2018), "The Effects of the Bank of Japan's Corporate and Government Bond Purchases on Credit Spreads," IMES Discussion Paper Series, No.2018-E-4, Institute for Monetary and Economic Studies, Bank of Japan.

Ochi, Kaori and Mitsuhiro Osada (2023), "Developments in Corporate Bond Spreads at Issuance," Bank of Japan Review Series, No.2023-E-8.

Ochi, Kaori and Mitsuhiro Osada (2024), "Market Functioning in the Japanese Corporate Bond Market," Bank of Japan Working Paper Series, No.24-E-5.

[47] For details, see Appendix 5 in Bank of Japan (2021).

Bank of Japan (2021), *Assessment for Further Effective and Sustainable Monetary Easing*.

a deterioration in the confidence of firms and households.

On the other hand, caveats are often raised regarding the purchases of risk assets, especially ETFs. First, from the perspective of corporate governance, it has been pointed out that firms' management is less disciplined when the Bank holds ETFs. In this regard, the voting rights of individual shares comprising ETFs held by the Bank are exercised appropriately by asset management companies that have accepted the Stewardship Code. Through this process, corporate discipline has been exerted in the same manner as investment trusts financed by private funds. Second, it has been pointed out that through the ETF purchases, the Bank's indirect shareholding ratio in some ETF component firms has increased, resulting in price distortions. In fact, there is an aspect that the Bank's indirect shareholding ratio in some ETF component firms has increased reflecting the design of stock price indices that are linked to the ETFs eligible to the Bank's purchases, such as the Nikkei 225 Stock Average. Some are of the view that this has resulted in persistent price distortions. Given this, to reduce the distortionary impact, the Bank gradually increased the share of the TOPIX-linked ETFs in its ETF purchases and decided to purchase only TOPIX-linked ETFs from April 2021 (Chart 2-4-7).[48] Third, some have pointed out that, given the high volatility in the prices of risk assets,

Chart 2-4-7: Allocation of the BOJ's Annual Purchases of ETFs

	TOPIX	TOPIX, Nikkei 225 Stock Average, JPX-Nikkei 400
Oct. 2010 - Sept. 2016	In proportion to ETF's market value	
Oct. 2016 - Jul. 2018	2.7 tril. yen	3 tril. yen (in proportion to ETF's market value)
Aug. 2018 - Apr. 2020	4.2 tril. yen	1.5 tril. yen (in proportion to ETF's market value)
May 2020 - Mar. 2021	75%	25%
Apr. 2021 -	100%	No Purchase

Source: Bank of Japan.
Note: Purchase of ETFs linked to the JPX-Nikkei 400 started in November 2014. For the period from October 2010 to September 2016, the purchase amount of ETFs that track any of the three indices (TOPIX, Nikkei 225 Stock Average, or JPX-Nikkei 400) was set so that the Bank's purchase would roughly be proportionate to the total market value of that ETF issued.

[48] For example, Barbon and Gianinazzi (2019) and Ichiue (2024) indicate that the Bank's ETF purchases have affected accumulative returns from some individual stocks.

Barbon, Andrea and Virginia Gianinazzi (2019), "Quantitative Easing and Equity Prices: Evidence from the ETF Program of the Bank of Japan," *The Review of Asset Pricing Studies*, Vol.9(2), pp.210-255.

Ichiue, Hibiki (2024), "The Bank of Japan's Stock Holdings and Long-term Returns," Working Papers on Central Bank Communication Design, No.049, Graduate School of Economics, University of Tokyo.

the Bank's finances might be affected by the purchase of such assets. In this regard, the Bank has developed measures to ensure its financial soundness, such as building provisions for losses when the total market value of ETFs held by the Bank becomes lower than the book value.

Looking at central banks in other advanced economies, the European Central Bank conducted large-scale purchases of assets including corporate bonds, in addition to sovereign bonds, from the mid-2010s to the early 2020s. The U.S. Federal Reserve conducted purchases of corporate bonds and other securities, while its purchase operations were in place only during periods of significant market stress, suggesting that purchases of risk assets were implemented differently across central banks. Major central banks other than the Bank of Japan have not implemented the purchases of equities or REITs as a monetary policy measure, either in the form of investment trusts or individual stock purchases. Officials of these central banks and others in relation do not completely rule out the possibility of expanding the asset class eligible for the central bank purchases. That said, they note that when central banks consider the expansion, it is important to pay attention to the credit risks of their portfolio and the possibility of benefiting specific sectors and firms, and to weigh the overall benefits and costs of implementing the purchases.[49]

When considering the purchase of risk assets, it is necessary to confirm whether affecting the risk premia is needed in the given situation. If the purchases are deemed necessary, it is important to design a framework that takes into account the caveats mentioned above.

[49] See, for example, Bernanke (2022) and Schnabel (2024).

Schnabel, Isabel (2024), "The Benefits and Costs of Asset Purchases," Speech at the 2024 BOJ-IMES Conference.

Appendixes

Appendix 1: Exchanging Views and Other Initiatives for the Review

In the course of conducting the Review, the Bank implemented various initiatives, including the exchange of opinions, in order to enhance objectivity and transparency through incorporating insights from a variety of sources.

Initiatives

The Bank regularly exchanges views with members of the domestic and international academic community as well as financial market participants, and conducts interviews with firms and other entities through its network of headquarters and branches. In addition to these opportunities, the Bank exchanged views, conducted surveys, and solicited public opinions in the following ways:

I. Exchange of Views at Meetings with Local and Business Leaders, etc.

In meetings such as those with local and business leaders in each region,[50] Policy Board members exchanged views on economic, price, and financial conditions and the conduct of monetary policy over the past 25 years. The Bank also received opinions from its counsellors, financial institutions, and other relevant organizations.

II. Exchange of Views with Experts at Workshops, etc.

Two workshops on the Review were held, in December 2023 and May 2024 (Chart A1-1). In addition, the entire review and some related issues were discussed with domestic and foreign experts at various conferences and seminars, such as a joint conference co-hosted with the Center for Advanced Research in Finance at the University of Tokyo, an international conference

Chart A1-1: Exchange of Views at Workshops, etc.

1. **10th Joint Conference: CARF and Bank of Japan Research and Statistics Department**
   - "Changes in the Global Economic Landscape and Japan's Economy" (November 2023)
2. **1st Workshop on the "Review of Monetary Policy from a Broad Perspective"**
   - "The Effects and Side Effects of Unconventional Monetary Policy" (December 2023)
3. **2nd Workshop on the "Review of Monetary Policy from a Broad Perspective"**
   - "Economic Activity, Prices, and Monetary Policy over the Past 25 Years" (May 2024)
4. **2024 BOJ-IMES Conference**
   - "Price Dynamics and Monetary Policy Challenges -- Lessons Learned and Going Forward --" (May 2024)
5. **Program on International Financial Systems (PIFS) and the Bank of Japan, Monetary Policy Seminar**
   - "Price Dynamics in Japan" and "Unconventional Policy Tools" (June 2023)
   - "The BoJ's Monetary Policy: Past, Present and Way Forward" (June 2024)

[50] A total of 17 sessions were conducted nationwide between June 2023 and March 2024.

hosted by the Institute for Monetary and Economic Studies, and a seminar sponsored by the Program on International Financial Systems (PIFS).[51]

III. Conducting Large-Scale Surveys of Firms, Households, and Financial Institutions

The Bank conducted surveys of firms, households, and financial institutions on their views of economic, price, and financial conditions over the past 25 years and the monetary policy conduct under those conditions (Chart A1-2).

With regard to firms, between November 2023 and February 2024, the Bank conducted the *Survey regarding Corporate Behavior since the Mid-1990s*, targeting domestic non-financial corporate firms across a wide range of industries and sizes. The purpose of this survey was to gain a better understanding of the characteristics of corporate behavior since the mid-1990s and its impact on economic trends and formation of wages and prices in Japan.

With regard to households, the Bank added items to the *Opinion Survey on the General Public's Views and Behavior* (March 2024 Survey) asking respondents about their perspectives on the experience of continuing monetary easing and maintaining low interest rates over the past 25 years, as well as their views on the monetary policy conduct.

With regard to financial institutions, the Bank conducted its *Bond Market Survey, Special Survey* between October 2023 and November 2023, targeting not only banks and securities companies that hold current account at the Bank, but also insurance companies and asset management

[51] Founded in 1986 and supported by Harvard Law School non-financially, PIFS organizes international symposia and other events. Since 1998, it has held an annual high-level symposium on U.S.-Japan economic issues.

Chart A1-2: Surveys of Firms, Households, and Financial Institutions

1. *Survey regarding Corporate Behavior since the Mid-1990s*

Sample	Nonfinancial corporations: 2,509 firms (from large firms to small and micro firms)
Survey period	From November 2023 to February 2024
Survey methodology	In person, by mail, or online
Response rate	89.9%
Main items	- Firms' price setting - Firms' wage setting - Prices and business environment - Perception of monetary easing over the past 25 years

2. *Opinion Survey on the General Public's Views and Behavior*

Sample	Households: 3,970 people living in Japan who are at least 20 years of age
Survey period	From February 2024 to March 2024 (added special survey items on March 2024 Survey)
Survey methodology	By mail or online
Response rate	50.4%
Main items	- Views on prices and livelihood - Perception of monetary easing over the past 25 years

3. *Bond Market Survey* (Special Survey)

Respondents	Financial institutions: 70 companies (Eligible institutions for BOJ's outright purchases and sales of JGBs and major insurance companies, asset management companies, etc.)
Survey period	From October 2023 to November 2023 (conducted as a special survey separate from regular quarterly surveys)
Main items	- Bond market functioning over the past 25 years - Issues in bond market and changes in its structure during the period of lower functioning

Note: Survey 2. was not conducted in Ishikawa Prefecture, given the effects of the 2024 Noto Peninsula Earthquake.

companies. The purpose of this survey was to determine the impact, including side effects, of the various unconventional monetary policies implemented in different phases over the past 25 years, mainly on the bond market (JGB market).

IV. Conducting a "Public Consultation" via the Internet and by Mail

In addition, a survey was conducted via the internet and mail to gather a wide range of opinions without limiting the scope of the survey, and a total of 172 opinions were received.

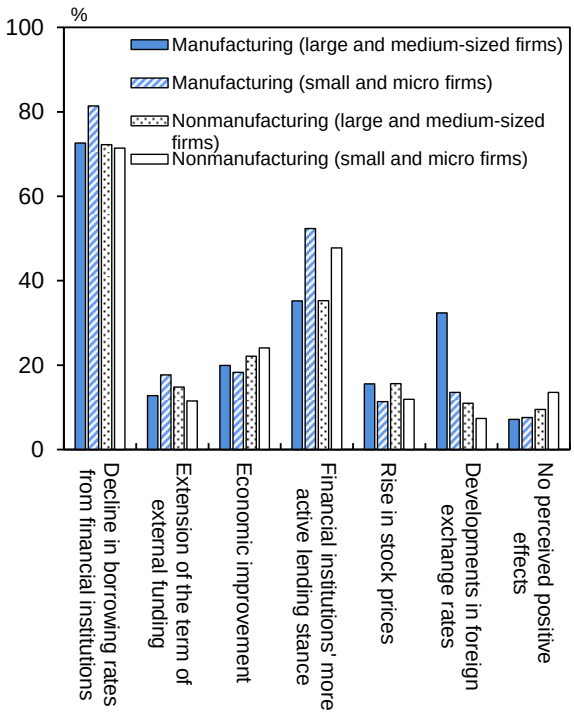
Main Opinions

The opinions gathered through the meetings, workshops, surveys, and "Public Consultation" are wide-ranging. Among them, various opinions were received on both the effects and side effects of monetary easing in terms of monetary policy management over the past 25 years. Highlights of the exchange of views with internal and external experts at the workshops and other meetings are published in the meeting summaries. The main results of the various surveys and the main opinions received from individuals, corporations and financial institutions are as follows.[52]

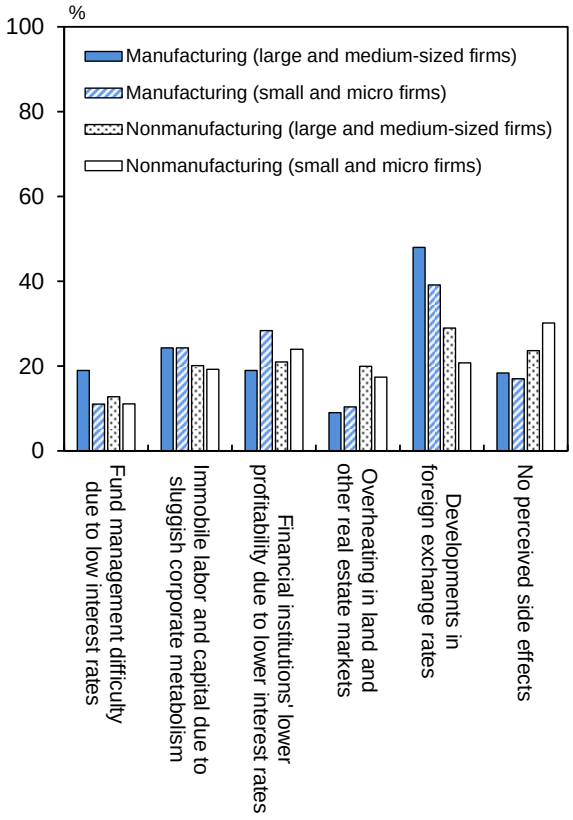
Regarding the positive effects of monetary easing, the following points were frequently noted: (1) reduced interest payment burdens on businesses and households, (2) promotion of business investment and increased lending by financial institutions, (3) support for the economy and stabilization of the financial system, (4) promotion of business model reforms at financial institutions,

Chart A1-3: Perception of the Positive and Side Effects of Monetary Easing on Firms

1. Perception of the Positive Effects



2. Perception of the Side Effects



Source: Bank of Japan.
Note: For details, see the *Survey regarding Corporate Behavior since the Mid-1990s*.

[52] The results of the surveys other than those related to the conduct of monetary policy management are presented in the relevant appendices: (1) Appendix 5 shows firms' wage- and price-setting behavior over the past 25 years. (2) Appendix 11 shows the impact of large-scale monetary easing on the functioning of financial markets. (3) Appendix 15 shows perspectives of households and firms on a "state where both wages and prices will not increase easily."

and (5) dispelling the deflationary mindset (Charts A1-3, A1-4, and A1-5).

On the other hand, regarding the side effects of the prolonged period of monetary easing, the following points were frequently noted: (1) decline in profitability of financial institutions and associated increase in risk-taking, (2) decline in financial intermediary and market functions, (3) decrease in interest income on savings and other deposits, (4) delays in addressing structural issues and stagnation in corporate dynamism, (5) negative impacts caused by one-sided exchange rate movements, (6) deteriorating financial situation of the Bank, (7) loosening of fiscal discipline (Charts A1-3, A1-4, and A1-6).

Along with the above points regarding the positive effects and side effects of monetary easing, there were calls for the unwinding of large-scale monetary easing, as well as for its continuation, from both sides.

Publications in the Broad-Perspective Review Series

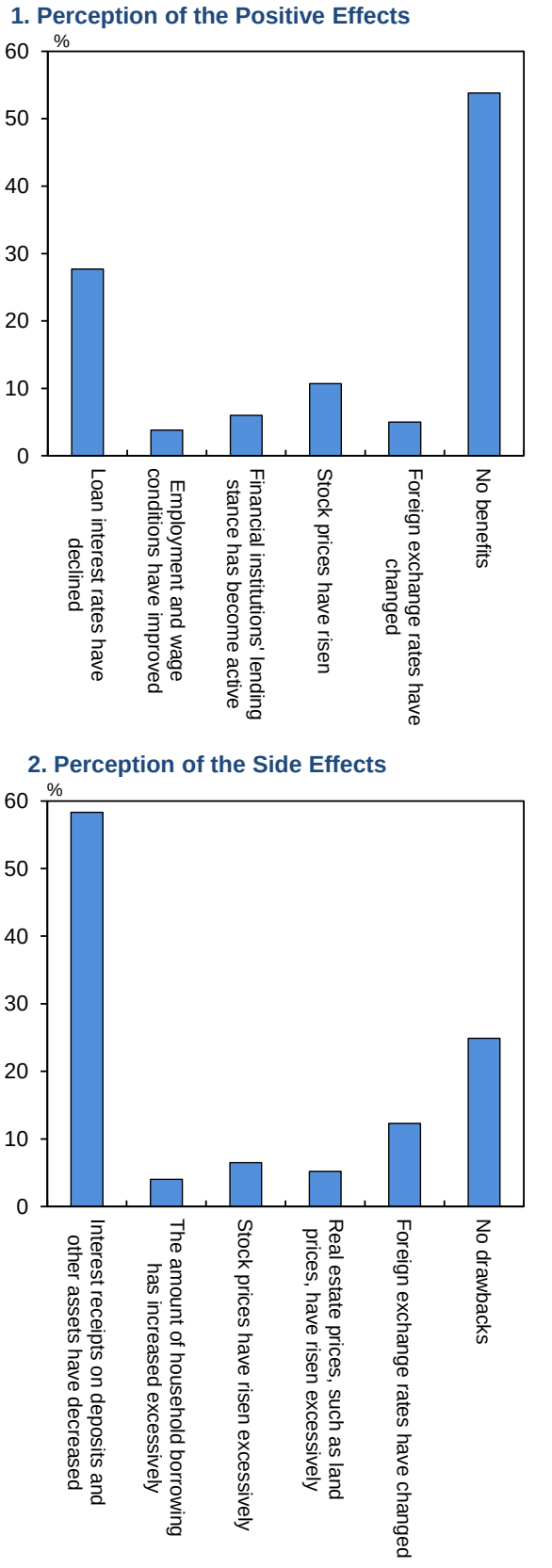
Bank of Japan (2024a), *Results of the Survey regarding Corporate Behavior since the Mid-1990s*, Regional Economic Report Annex.

Bank of Japan (2024b), "The Effects and Side Effects of Unconventional Monetary Policy: Summary of the First Workshop on the 'Review of Monetary Policy from a Broad Perspective,'" Bank of Japan Research Paper.

Bank of Japan (2024c), "Economic Activity, Prices, and Monetary Policy over the Past 25 Years: Summary of the Second Workshop on the 'Review of Monetary Policy from a Broad Perspective,'" Bank of Japan Research Paper.

Bank of Japan Research and Statistics Department (2024), "Summary of 10th Joint

Chart A1-4: Perception of the Positive and Side Effects of Monetary Easing on Households



Source: Bank of Japan.
Note: For details, see the *Opinion Survey on the General Public's Views and Behavior* (March 2024 Survey).

Conference: CARF and Bank of Japan Research and Statistics Department: 'Changes in the Global Economic Landscape and Japan's Economy,'" Bank of Japan Research Paper (in Japanese).

Hagio, Wataru, Daisuke Ikeda, Satoshi Kobayashi, and Nao Sudo (2024), "Price Dynamics and Monetary Policy Challenges – Lessons Learned and Going Forward – Summary of the 2024 BOJ-IMES Conference," IMES Discussion Paper Series, No.2024-E-11, Institute for Monetary and Economic Studies, Bank of Japan.

Chart A1-5: Opinions on the Positive Effects of Monetary Easing

1. Reduced Interest Payment Burdens on Businesses and Households

Firms	Monetary easing has benefited regional small and medium-sized enterprises by reducing the interest payment burden.
Firms	We strongly feel that prolonged monetary easing has financially supported small and medium-sized firms' business activities under deflation. Low borrowing rates also encouraged us to diversify business areas.
Firms	Although it has been pointed out that the low interest rate environment has been tough for financial institutions, it has been very beneficial for non-financial corporations.
Individuals	The low interest rate environment has been beneficial for individuals' mortgage repayments. I would like to see a policy to offset the increase in the repayment burden introduced when the low interest rate policy is lifted.

2. Promotion of Business Investment and Increased Lending by Financial Institutions

Firms	Monetary easing has been effective to some extent in that it has encouraged the private sector to continue investing.
Firms	We feel that the low interest rate policy has had a certain level of positive effect on small and medium-sized enterprises in that it has encouraged fixed investment.
Financial Institutions	A decline in funding rates has contributed to the expansion of firms' investment and businesses.

3. Support for the Economy and Stabilization of the Financial System

Firms	Monetary easing conducted in the late 1990s, after the bubble burst, was effective to some extent for small and medium-sized enterprises by preventing excessive recession and supporting employment, etc.
Financial Institutions	Without doubt, monetary easing succeeded in supporting Japan's economy in the long term, through the so-called lost three decades.
Financial Institutions	In order to deal with bankruptcy of financial institutions and the non-performing loan problem, the Bank introduced the Zero Interest Rate Policy and the Quantitative Easing Policy, which stabilized the financial system. During the COVID-19 pandemic, thanks to financial support measures including so-called zero-zero loans (interest-free and unsecured loans) and low interest rate loans, and the Bank's funds-supplying operations, we could perform our financial intermediation functions, which contributed to preventing large-scale bankruptcy and loss of employment.
Individuals	We have often been faced with insufficient monetary easing and hasty monetary tightening. Japan's economy has recently been getting back on the appropriate growth path thanks to monetary easing over the past decade.

4. Promotion of Business Model Reforms at Financial Institutions

Firms	Under the prolonged low interest rate environment, financial institutions have expanded their support of small and medium-sized enterprises; not only financial support but also employment agent services, provision of business information, support for business revitalization, etc. This expansion has led to closer support for small and medium-sized enterprises like us.
Financial Institutions	Monetary easing was the trigger for financial institutions to try to reform their business models, as it made them realize that it's difficult to run a business relying on the expansion of loans outstanding and interest margins.
Financial Institutions	Monetary easing brought the opportunity to reconsider our business model as a regional bank and to shift our focus to non-financial transactions, consulting services and revitalization of the regions.

5. Dispelling the Deflationary Mindset

Financial Institutions	It has been 10 years since the Bank introduced Quantitative and Qualitative Monetary Easing (QQE) aimed at achieving the price stability target of 2 percent. Although it has not yet been achieved in a sustainable and stable manner, QQE was effective to a certain extent in dispelling "deflation" in the sense of a persistent decline in price levels.
Financial Institutions	Monetary easing has been sufficiently effective in dispelling the deflationary mindset and supporting the economy.

Sources: Interviews with enterprises; Opinions collected through the "Public consultation on the review of monetary policy from a broad perspective."

Chart A1-6: Opinions on the Side Effects of Monetary Easing

1. Decline in Profitability of Financial Institutions and Associated Increase in Risk-Taking

Firms	We felt a strong sense of connection with and trust in our main bank, as it used to provide us with loans directly. Currently, however, our main bank acts more like a broker, as it has increased proposals for syndicated loans and other fee- and commission-based business. We are worried whether we can actually borrow from it when we are in need of funds.
Financial Institutions	Financial institutions have faced considerable side effects from monetary easing, such as excessive competition in the loan market and increased securities investment activating risk-taking.
Financial Institutions	In order to survive under the Negative Interest Rate Policy, lending departments of financial institutions have had to accept risks to some extent and strengthened initiatives for structured finance businesses. They have also been forced to increase the amount of lending in order to secure profitability, which has resulted in excessive competition.

2. Decline in Financial Intermediary and Market Functions

Firms	Due to financial institutions' lower profitability, we feel that the quality of financial services has declined, as seen in increased fees and commissions.
Financial Institutions	The prolonged low interest rate environment due to monetary easing has broken the traditional business model of financial institutions of earning from interest rate margins, which has led to a significant decline in profits. In order to prevent a further decrease in profits, we have had to work on cost reduction, such as reducing the number of branches, which has made access to financial services less convenient, especially for elderly people.
Financial Institutions	The financial sector, including banks, has been trying to improve profitability in the adverse business environment due to extraordinarily low interest rates. The sector is concerned that when this situation is prolonged more than necessary, the side-effects of monetary policy will become greater through the deterioration of financial intermediary functions.

3. Decrease in Interest Income on Savings and Other Deposits

Individuals	After the introduction of the Negative Interest Rate Policy, it was not easy for financial institutions to increase their fixed deposit interest rates.

4. Delays in Addressing Structural Issues and Stagnation in Corporate Dynamism

Firms	While monetary easing was helpful in supporting the economy, change in the domestic industrial structure and growth of new industries has stagnated. As a result, Japan has seen a marked increase in capital investment outflows to foreign countries, which has led to international economic differentials.
Firms	The low interest rate environment for too long helped some enterprises survive that should have exited, and it became difficult to close the output gap.
Financial Institutions	At the beginning of the monetary easing, firms were provided with the initiative to increase their value added by capital investment or innovation. However, we are concerned that prolonged monetary easing has encouraged firms to maintain the status quo or to avoid taking on new challenges.

5. Negative Impacts Caused by One-Sided Exchange Rate Movements

Firms	While monetary easing was effective to some extent in correcting the excessive appreciation of the yen, prolonged easing generated drawbacks such as entrenchment of the yen's depreciation and a rise in import prices as yield differentials between Japan and other economies widened.
Individuals	Because of the persistent rise in prices arising from the excessive depreciation of the yen, people are becoming worse off.
Individuals	We can't make a living if the Bank doesn't raise the interest rate and support a stronger yen. Japan relies on imports for most of its food and energy resources, including crude oil. What adverse effect is the Bank concerned about in raising interest rates?

6. Deteriorating Financial Situation of the Bank

Financial Institutions	There is an observation that the Bank can't change its policy framework because it can deteriorate its financial soundness, considering that raising the policy interest rate accompanies the increase in interest payments to Bank's current account.

7. Loosening of Fiscal Discipline

Financial Institutions	Monetary policy over the past decade has caused a deterioration in market functioning and an enormous amount of government debt resulting from the loosening of fiscal discipline, which casts a shadow over our future.
Financial Institutions	It seems that both the government and the people have been losing awareness of fiscal discipline.
Individuals	The financial discipline of the government or ruling party has loosened, as they have been continually introducing large-scale supplementary budgets. It is the Bank that is in effect financing the government by buying deficit-covering government bonds.

Sources: Interviews with enterprises; Opinions collected through the "Public consultation on the review of monetary policy from a broad perspective."

Appendix 2: Developments in the Natural Rate of Interest

The natural rate of interest is the level of real interest rates at which investment and saving are balanced and neutral with respect to the economy and prices; it is used as one of the benchmarks for evaluating the stance of monetary policy. Specifically, the monetary policy stance is considered "tight" if actual real interest rates exceed the natural rate of interest, and "accommodative" if they fall below. The natural rate of interest changes in response to factors such as structural changes related to economic activity and prices, and because it is not a directly observable, it needs to be estimated using certain methods. This appendix summarizes (1) the issues surrounding the measurement of the natural rate of interest, and (2) the trend and background of the natural rate of interest since the 1990s.

Discussions on Measuring the Natural Rate of Interest

Based on Obstfeld (2023), methods for estimating the natural rate of interest can be divided into four types: time series models, term structure models, semi-structural models, and structural models (Chart A2-1).[53]

Each approach has its own advantages and disadvantages. There is no clear superiority or inferiority between them. In general, while time series and term structure models have the advantage of easily avoiding issues arising from the specification of the model, the estimation results are more likely to be influenced by factors such as actual observed real interest rates. In contrast, semi-structural and structural models have the advantage of being more easily

Chart A2-1: Estimation Methods of the Natural Rate of Interest

Type	Idea
Time series model	Estimating the long-run trend in interest rates, and interpreting this as the natural rate of interest. [Literature] ・Del Negro et al. (2017) ・Kiley (2020) ・Goy and Iwasaki (2024)
Term structure model	Using the term structure (yield curve information) to identify the expected path of short-term interest rates, and interpreting this as the natural rate of interest. [Literature] ・Kim, Walsh and Wei (2019) ・Bauer and Rudebusch (2020)
Semi-structural model	Assuming some structural equations, such as the IS curve and the Philips curve, and estimating the interest rate level that makes the output gap zero. [Literature] ・Holston, Laubach and Williams (2023) ・Brand and Mazelis (2019) ・Imakubo, Kojima and Nakajima (2015) ・Nakajima et al. (2023)
Structural model	Using micro foundations of the behavior of economic agents to estimate the interest rate level in a perfectly elastic price equilibrium with no nominal rigidities, and taking this to be the natural rate of interest. [Literature] ・Barsky, Justiniano and Melosi (2014) ・Okazaki and Sudo (2018)

[53] For details, see Nakano, Sugioka, and Yamamoto (2024) and Obstfeld (2023).

interpreted based on economic theory, but the estimation results strongly depend on the assumptions of the model. Therefore, when assessing the developments of the natural rate of interest, it is desirable not to rely on a single model or estimation method, but to use multiple estimation methods, and estimation results should be interpreted with some caution.

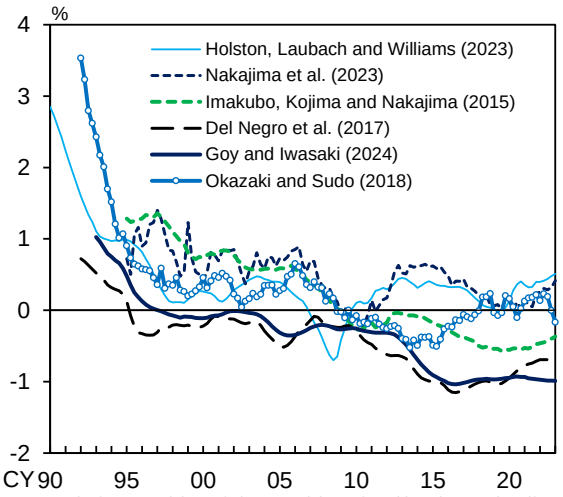
Trends in the Natural Rate of Interest and its Background

From the perspectives presented above, the Bank currently estimates the level of the natural rate of interest using six methods. All of these estimates have shown a declining trend since the early 1990s (Chart 1-1-1).[54]

The "Background" of the Review points out that this declining trend in the natural rate of interest since the 1990s is attributed to (1) the cautious risk-taking attitude of companies since the burst of the bubble in the early 1990s and the decline in the potential growth rate, (2) globalization, and (3) demographic changes. The following part presents the analyses related to these issues.

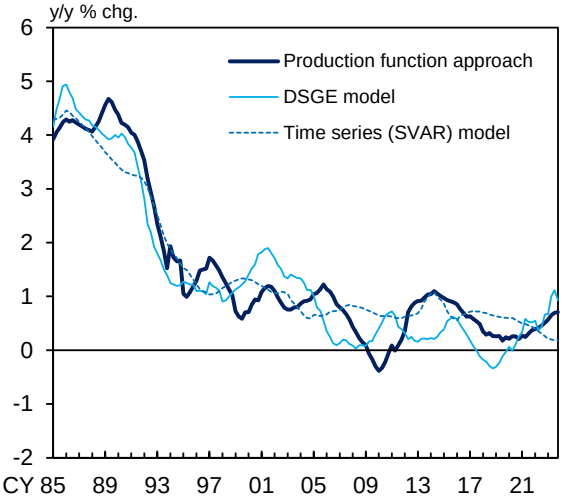
The first factor is that firms became more cautious in their risk-taking and the potential growth rate declined after the burst of the bubble in the early 1990s. In general, if the rate of return on capital is depressed as the rate of potential growth declines, the interest rate at which investment and saving are balanced will decline. Since the 1990s, the potential growth rate was on a downward trend due to factors such as the slowdown in the pace of technological progress and capital accumulation, and it remained low in recent years (Chart A2-2).[55]

Chart 1-1-1: Natural Rate of Interest



Sources: Bank of Japan; Ministry of Finance; Ministry of Health, Labour and Welfare; Cabinet Office; Ministry of Internal Affairs and Communications; Bloomberg; Consensus Economics Inc., "Consensus Forecasts."
Note: The estimates are based on staff calculations using the models proposed in the different papers.

Chart A2-2: Potential Growth Rate



Sources: Bank of Japan; Cabinet Office; Ministry of Internal Affairs and Communications; Ministry of Health, Labour and Welfare; Ministry of Economy, Trade and Industry.
Note: For details, see Fukunaga et al. (2024a).

[54] For details, see Nakano, Sugioka, and Yamamoto (2024).

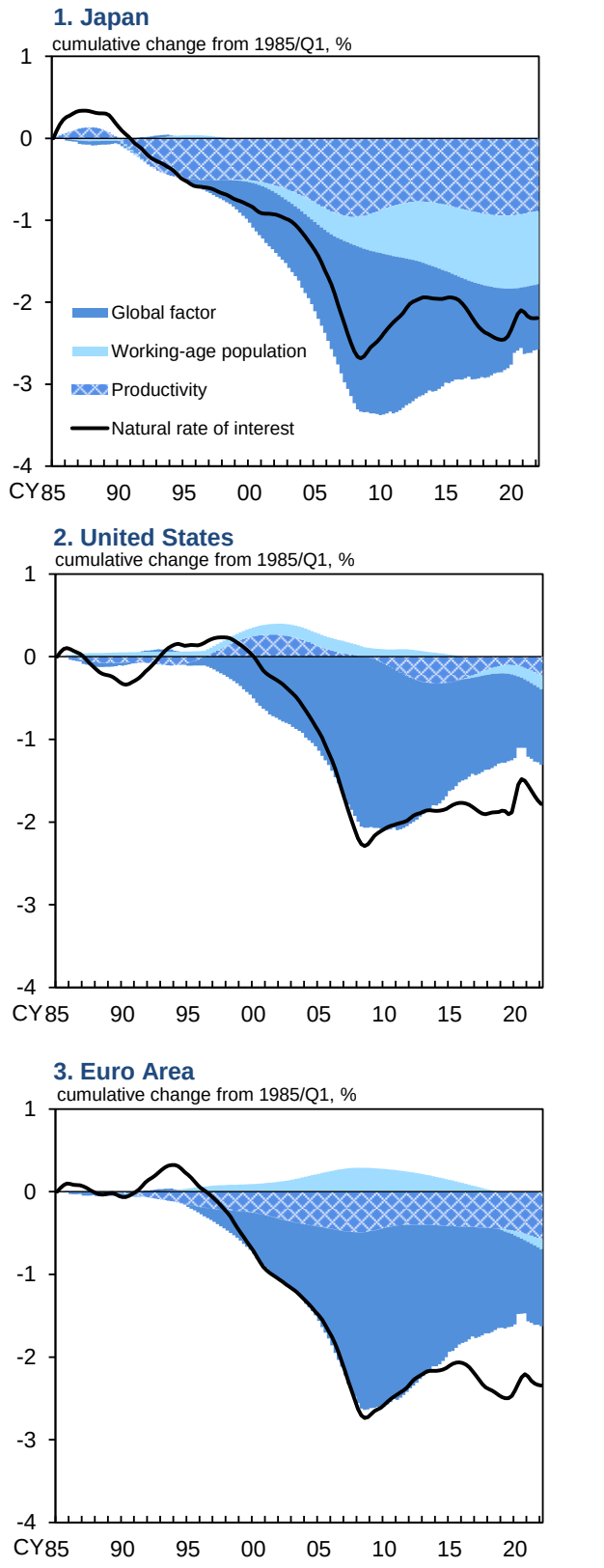
[55] The potential growth rate is often defined as the growth trend in supply capacity, derived by smoothing out business cycle (aggregate demand) fluctuations. However, there are various methods for estimating the potential growth rate, as in the natural rate of interest, and thus the estimation results

When considering the outlook for the natural rate of interest, the following issues are also important: whether efforts including the progress in addressing digital transformation (DX) and green transformation (GX) will raise productivity; whether the behavior of firms including regional small and medium-sized enterprises (SMEs) will change with a more aggressive spending attitude; and whether the potential growth rate will increase along with these changes.

The second factor is globalization. Since the 1990s, long-term interest rates in advanced economies have generally been on a downward trend. Overseas central bank officials have frequently pointed to the influence of the "global saving glut" caused by the growing demand for safe assets in emerging economies as a reason for this trend.[56]

In order to understand the impact of global factors, this section conducts the estimation of the natural rate of interest for advanced economies, taking into account the global supply and demand for safe assets and the spillover of country- or region-specific real factors to other countries or regions (Chart A2-3).[57] The estimation is conducted with a specification in which the impact of globalization on the natural rate of interest could change in response to its progress, in order to examine the impact of the remarkable progress of globalization from the late 1990s to the early 2000s. The results

Chart A2-3: Impact of the Global Factor on the Natural Rate of Interest



Sources: BIS; The Brookings Institution; FRB; FRED; HAVER; United Nations; Bergeaud, Cette, and Lecat (2016); Ferreira and Shousha (2023); Hatayama et al. (2024).
Note: Figures are based on the smooth transition model, which assumes structural change in the relationships between the individual variables. For details, see Hatayama et al. (2024).

should be interpreted with some caution. Fukunaga et al. (2024a) present the estimation results by various methods (Chart A2-2). They also point out that a decline in the potential growth rate may lead to a decline in firms' and households' expectations for future economic growth and, in turn, a drop in capital investment demand. They then argue that this may spill over to the supply side, resulting in a further decline in the potential growth rate.

[56] For discussions by overseas central bank officials on the impact of the global saving glut on the natural rate of interest, see Bernanke (2005) and Williams (2016) for example.

[57] For details of the analytical methods and results, see Hatayama et al. (2024).

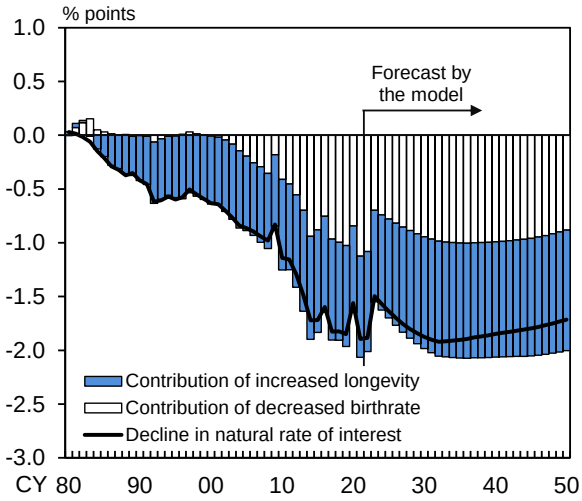
of the analysis suggests that (1) the extent to which global factors affect the natural rate of interest increased around 2000 and (2) under these circumstances, global factors may have affected the common declining trend of the natural rate of interest observed in various countries and regions to some degree.

When considering the outlook, as pointed out in the "Background," the issue of whether the trend in globalization changes is also important. The worldwide trend toward decarbonization, for example, may also affect the natural rate of interest through changes in corporate investment behavior and international capital flows.

The third factor is the issue of demographic changes. The decline in the labor supply resulting from the falling birthrate and aging population would also lead to the decline in the potential growth rate, as mentioned above. In addition, it is pointed out that as households accumulate savings in preparation for longer life expectancies, capital stock would be in excess relative to the labor force, and this would put downward pressure on the natural rate of interest, which balances saving and investment.

In this regard, Chart A2-4 presents the results of a counterfactual simulation comparing the natural rate of interest in the actual case with a counterfactual case where the growth rate of the young population and survival rates by age were fixed at their 1980 levels, using an overlapping generation model.[58] The difference between the two results could be interpreted as the effect of declining birthrates and increasing longevity after 1980. The analysis shows that over the past 40 years, the declining birthrate and aging population have pushed down the natural rate of interest by

Chart A2-4: Impact of Demographic Trends on the Natural Rate of Interest



Sources: Cabinet Office; Katagiri et al. (2024b); Ministry of Internal Affairs and Communications; National Institute of Population and Social Security Research.
Note: Figures show the deviation (percentage points) from the baseline where both the growth rate of the age-21 population and the survival rates are set at the actual values from 1980 and beyond, based on simulation using overlapping generations models. See Katagiri et al. (2024b) for details.

[58] For details of the analytical methods and results, see Katagiri et al. (2024b).

at least one percentage point. Meanwhile, estimates based on certain assumptions about future demographics suggest that further downward pressure on the natural rate of interest from a declining birthrate and aging population may be limited going forward.

Publications in the Broad-Perspective Review Series

Fukunaga, Ichiro, Yoshihiko Hogen, Yojiro Ito, Kenji Kanai, and Satoshi Tsuchida (2024a), "Potential Growth in Japan: Issues on Its Relationship with Prices and Wages," Bank of Japan Working Paper Series, No.24-E-16.

Hatayama, Yudai and Yuto Iwasaki (2024), "Estimating the Natural Yield Curve in Japan Using a VAR with Common Trends," Bank of Japan Working Paper Series, No.24-E-17.

Hatayama, Yudai, Yuto Iwasaki, Kyoko Nakagami, and Tatsuyoshi Okimoto (2024), "Globalization and Its Growing Impact on the Natural Rates of Interest in Developed Economies," Bank of Japan Working Paper Series, No.24-E-13.

Hirakata, Naohisa and Mitsuru Katagiri (2024), "Role of Foreign Direct Investment as a Long-Term Capital Flow Channel," IMES Discussion Paper Series, No.2024-E-5, Institute for Monetary and Economic Studies, Bank of Japan.

Itai, Yusuke, Ryota Maeno, Akira Miyoshi, and Asuka Nishino (2024), "Environment for Startups in Japan and Initiatives in the Regional Japan," Bank of Japan Review Series, No.2024-E-5.

Katagiri, Mitsuru, Takemasa Oda, Yasutaka Ogawa, Takeshi Shinohara, and Nao Sudo (2024b), "Demographic Trends and

Household Savings and Investment," Bank of Japan Research Laboratory Series, No.24-E-1.

Nakano, Shogo, Yu Sugioka, and Hiroki Yamamoto (2024), "Recent Developments in Measuring the Natural Rate of Interest," Bank of Japan Working Paper Series, No.24-E-12.

Oda, Takemasa (2024), "A Quantitative Assessment of the Impact of Deflation in an Aging Economy," IMES Discussion Paper Series, No.2024-E-14, Institute for Monetary and Economic Studies, Bank of Japan.

Ogawa, Yasutaka and Jiro Yoshida (2024), "Aging, Housing, and Macroeconomic Inefficiency," IMES Discussion Paper Series, No.2024-E-4, Institute for Monetary and Economic Studies, Bank of Japan.

Shirota, Toyoichiro and Satoshi Tsuchida (2024), "Aggregate Implications of Changing Industrial Trends in Japan," Bank of Japan Working Paper Series, No.24-E-2.

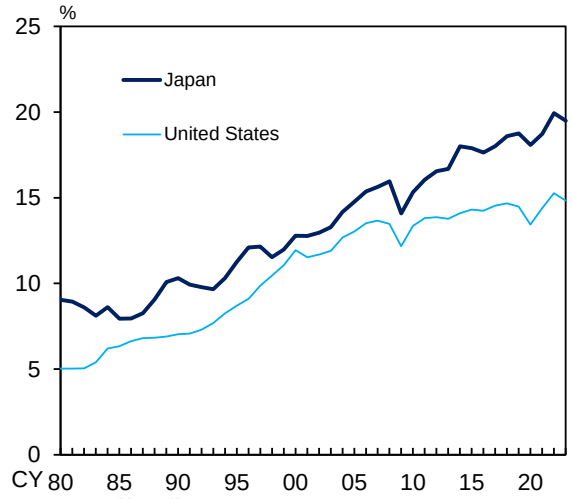
Appendix 3: Globalization and Price Developments: Estimation by Structural VAR Model

It has been noted that globalization since the 1990s has pushed down prices in major countries through multiple channels.[59] In particular, as the import-penetration ratio increased in Japan, pressures pushing down prices of goods intensified due to price competition with imports from China and other Asian countries (Chart 1-1-10).

A sign-restricted structural VAR model is estimated, which can identify seven types of shocks: supply, demand and monetary policy shocks, both domestic and global, as well as exchange rate shocks which are not explained by other shocks (Chart A3-1(1)).[60] Data on real GDP, consumer prices, nominal interest rates, both in Japan and overseas (G20 countries excluding Japan), and Japan's nominal effective exchange rates are used for the VAR model. Global demand shocks basically reflect the impact of overseas economic fluctuations but seem also to reflect the impact of factors such as fluctuations in energy prices resulting from changes in overall global energy demand. Global supply shocks seem to reflect the impact of factors such as the increase in inexpensive imports resulting from higher productivity overseas.

The estimation results by the above structural VAR model show that various global shocks had been pushing down the year-on-year rate of increase in Japan's consumer price index (less fresh food and energy) for a considerable period from the late 1990s to the late 2010s (Chart A3-1(2)). In particular, global supply shocks, including the effects of intensified price competition with

Chart 1-1-10: Import Penetration Rate



Sources: BEA; Cabinet Office.
Note: Import penetration rate = Imports / (GDP + Imports - Exports)

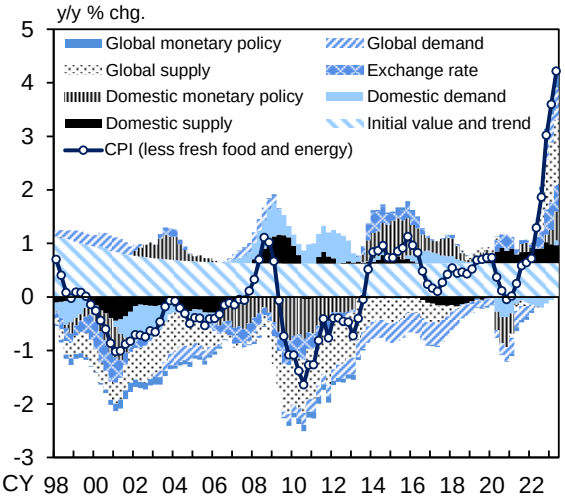
Chart A3-1: Historical Decomposition of CPI

1. Identification Restrictions

+	Sign restriction (+)
-	Sign restriction (-)
0	Long-run restriction
0	Small open economy assumption

		Variables / Shocks	Domestic: Supply	Domestic: Demand	Domestic: Monetary policy	Domestic: Exchange rate	Global: Supply	Global: Demand	Global: Monetary policy
Short-run restrictions	Domestic	1. Real GDP	+	+	-				
		2. Consumer prices	-	+	-				
		3. Nominal interest rate		+	+				
		4. Nominal effective exchange rate		+	+	+			
	Foreign	5. Share of Japan's real GDP in world real GDP	+	+	-		-	-	+
		6. Consumer prices	0	0	0		-	+	-
		7. Nominal interest rate	0	0	0	0		+	+
Long-run restrictions	Domestic	1. Real GDP		0	0			0	0
		2. Consumer prices							
		3. Nominal interest rate							
		4. Nominal effective exchange rate							
	Foreign	5. Share of Japan's real GDP in world real GDP	0	0	0			0	0
		6. Consumer prices	0	0	0				
		7. Nominal interest rate	0	0	0	0			

2. Historical Decomposition



Source: Fukunaga, Kido, and Suita (2024).
Note: Long-run zero restrictions assume that demand and monetary policy shocks have no long-run effect on the real GDP. Small open economy assumption imposes short- and long-run zero restrictions such that domestic and exchange rate shocks have no effect on foreign variables both in the short and long run.

[59] See Forbes (2019) for example.

[60] For details of the analytical methods and results, see Fukunaga, Kido and Suita (2024).

imported goods, due to globalization, are considered as having put downward pressure on prices.

In addition, the intensification of price competition with overseas firms led to a reduction in price markups for Japanese firms. As noted in Appendix 4, this has tended to suppress wages and, as a result, has led to entrenchment of the behavior and mindset based on the assumption that wages and prices will not increase easily.

Publications in the Broad-Perspective Review Series

Fukunaga, Ichiro, Yosuke Kido, and Kotaro Suita (2024), "Japan's Inflation under Global Inflation Synchronization," Bank of Japan Working Paper Series, No.24-E-4.

Hogen, Yoshihiko, Yojiro Ito, Kenji Kanai, and Naoya Kishi (2024), "Changes in the Global Economic Landscape and Issues for Japan's Economy," Bank of Japan Working Paper Series, No.24-E-3.

Appendix 4: Underlying Inflation and the Behavior and Mindset Based on the Assumption that Wages and Prices Will Not Increase Easily

From the late 1990s, Japan experienced a period of moderate deflation. The year-on-year rate of change in wages and prices remained near zero percent and this situation had become entrenched. This appendix analyzes, (1) the assessment of the situation of moderate deflation using indicators related to the underlying inflation; (2) the underlying changes in social structure and corporate behavior – the entrenchment of the behavior and mindset based on the assumption that wages and prices will not increase easily; and examines (3) changes in the 2020s.

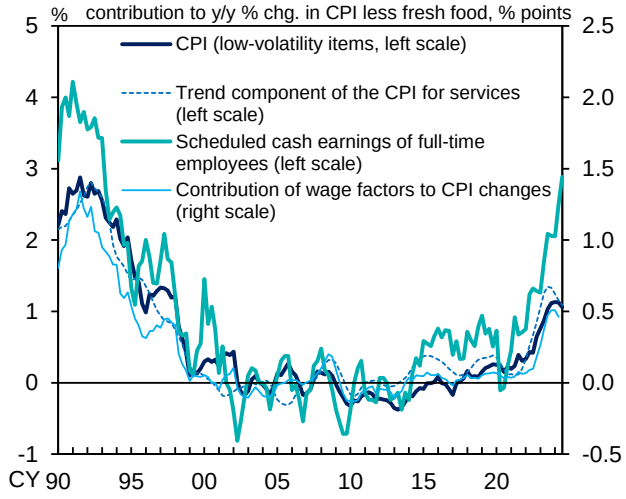
Price Developments since the Late 1990s: Trends in Underlying Inflation

From the late 1990s, the year-on-year rate of change in prices generally remained near zero percent and this situation had remained largely unchanged, although there were some phases of temporary increases due to rising import prices and other factors. It was particularly difficult for the prices of items with a high ratio of labor costs to total costs to move – most typically, service prices – as these items are less susceptible to the impact of import prices.

This situation can be confirmed by looking at underlying inflation that excludes factors including temporary cost-push effects such as rising import prices – indicators to capture the upward pressure on prices deriving from the linkage between wages and prices (Charts A4-1, A4-2, and 1-1-27(1)).[61]

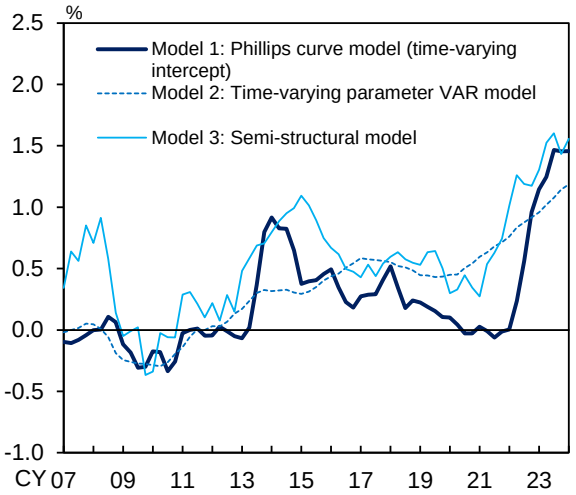
Although these indicators are estimated with some assumptions and they need to be interpreted with some latitude, all of them remained sticky until the 2010s, after declining to near zero percent in the

Chart A4-1: Indicators Likely Reflecting Wage Developments



Sources: Ministry of Internal Affairs and Communications; Ministry of Health, Labour and Welfare; Bank of Japan.
Note: For details, see Box 4 in the April 2024 Outlook Report, Ozaki et al. (2024), and Ueno (2024).

Chart A4-2: Estimates of Trend Inflation



Sources: Bank of Japan; Ministry of Health, Labour and Welfare; Ministry of Internal Affairs and Communications; Cabinet Office; Google Trends; QUICK, "QUICK Monthly Market Survey <Bonds>"; Consensus Economics Inc., "Consensus Forecasts"; Bloomberg.
Note: For details, see Box 4 of the April 2024 Outlook Report.

[61] For details of indicators in Charts A4-1, A4-2, and 1-1-27(1), see BOX 4 in Bank of Japan (2024d).

late 1990s. Looking at wage developments during this period, while macro-level nominal wages changed to some extent along with changes in bonus payments and an increase in part-time employment, the growth rate of regular workers' scheduled cash earnings remained near zero percent.

The Behavior and Mindset Based on the Assumption that Wages and Prices Will Not Increase Easily

Behind the situation in which wages and prices remaining sticky near zero percent year-on-year, were changes in social structure and in the behavior of firms and workers – the entrenchment of the behavior and mindset based on the assumption that wages and prices will not increase easily. This point can be confirmed by the following empirical analysis using micro-price data, in addition to a questionnaire survey of firms (*Survey regarding Corporate Behavior since the Mid-1990s*).[62]

First, from the late 1990s to the early 2010s, it was observed that (1) the cost of price adjustments – so-called menu costs – for firms rose; and (2) the degree of kink in the demand curve associated with firms' price-setting practices – the so-called kinked demand curve – became greater (Chart A4-3).[63]

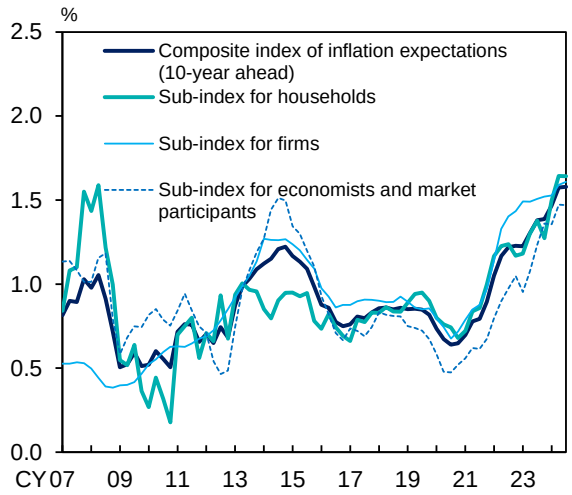
Regarding the former, the cost of price adjustments here includes not only the physical cost of replacing price tags (menu costs in the narrow sense) but also the indirect costs associated with information gathering and external negotiations for price revision (menu costs in the broad sense). Using a specific method of estimation, it can be observed that menu costs

[62] See Appendix 5.

[63] For details of the analysis methodology and results, see Furukawa et al. (2024).

Chart 1-1-27: Inflation Expectations

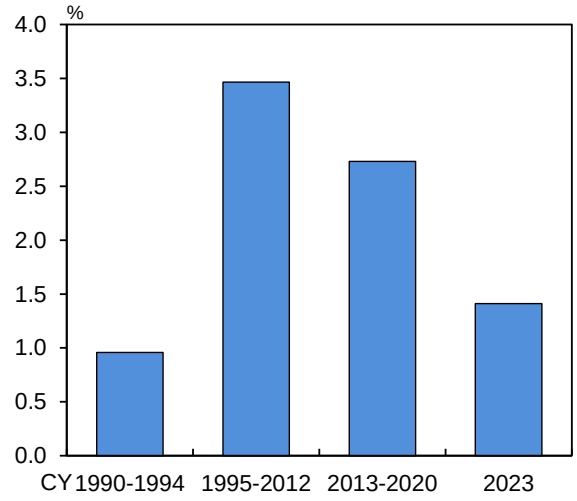
1. Composite Index of Inflation Expectations



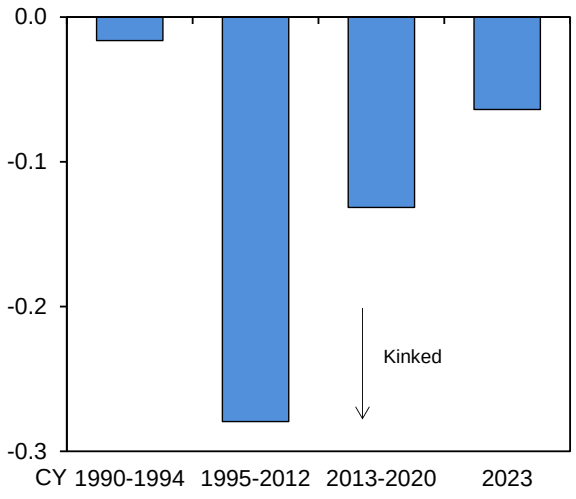
Sources: Bank of Japan; QUICK, "QUICK Monthly Market Survey <Bonds>"; Consensus Economics Inc., "Consensus Forecasts"; Bloomberg.
Note: Figures for the composite index of inflation expectations are based on the first principal component extracted from the following six indicators: two indicators for households from the *Opinion Survey on the General Public's Views and Behavior* (for qualitative and quantitative questions), one indicator for firms from the *Tankan*, and three indicators for economists and market participants from the QUICK Survey, the Consensus Forecasts, and data based on inflation swap rates. Data for firms before 2014 are obtained from Nakajima (2023).

Chart A4-3: Menu Costs and Kinked Demand Curve

1. Menu Cost to Raise Price



2. Kinkedness



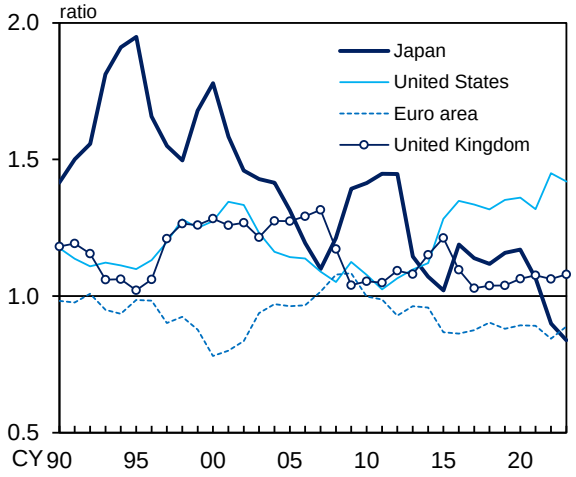
Source: Furukawa et al. (2024).
Note: These charts are derived by the dynamic model with a quasi-kinked demand curve for service prices. The menu cost to raise price is defined as the ratio of cost related to price increase relative to unit labor cost. "Kinkedness" is a parameter that defined the curvature of the quasi-kinked demand curve.

increased after the late 1990s.

Regarding the latter, the greater degree of kink in the demand curve means that a small price increase leads to a significant decrease in demand – if only one firm set its prices higher than its competitors, demand for its products and services will decrease significantly and there will be a large decline in its market share. Under these circumstances, firms are likely to be reluctant to pass on increased costs, and the optimal strategy for all firms, including competitors, is likely to be to keep prices unchanged.[64] If it is optimal for everyone to adopt the same behavior, in a situation where the behavior of each economic agent depends on the behavior of the other economic agents involved, this is known as "strategic complementarity."[65] The estimated results show that the degree of kink increased after the late 1990s, and the firmness of these mechanisms from the late 1990s to the early 2010s led to the spread of price-fixing practices.

Looking back at the situation from the mid to late 1990s, the correction of the price differential between domestic and overseas markets became an issue, partly due to the strong yen at that time, and from the late 1990s onward major firms underwent large-scale business restructuring and the breaking up of affiliations in their supply chains (Chart 1-1-16). Against this backdrop, customers became extremely sensitive to price hikes, and firms were inclined to absorb the rise in input prices by cutting costs and holding down selling prices. A widespread belief arose in society that

Chart 1-1-16: International Price Differentials (Major Advanced Economies)



Sources: BIS; IMF.
Note: Figures are calculated as PPP effective exchange rates / nominal effective exchange rates. PPP effective exchange rates are calculated as the geometric weighted averages of bilateral PPP exchange rates using the weights employed in the calculation of effective exchange rates.

[64] Watanabe (2022), and Aoki, Ichiue, and Okuda (2019) note that in Japan, in the continuing low inflation environment, firms were in an equilibrium in which it was optimal to adopt actions that did not raise prices.

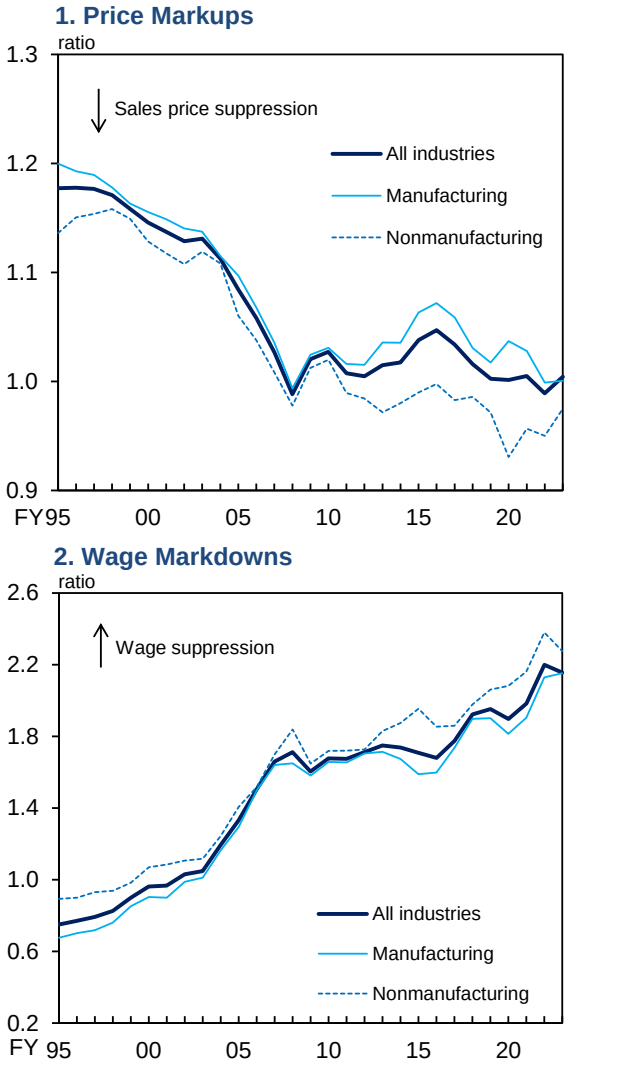
[65] Ikeda et al. (2023), and Koga, Yoshino, and Sakata (2019), using individual firms' data from the Bank of Japan's *Tankan* survey, show that "strategic complementarity" exists in the pricing behavior of Japanese firms and each firm sets its prices depending on other firms' pricing behavior.

firms should respond to rising input prices by cutting their costs.

Second, as price competition intensified and the "price markup" (the gap between selling prices and marginal costs) declined, combined with a long period of over-employment, there was the rise of the "wage markdown" (the gap between its marginal revenue product of labor and nominal wages), in which firms suppressed wages relative to productivity (Chart 1-1-23).[66] The results of the simultaneous estimation of price markups and wage markdowns show that Japanese firms secured their earnings by continuing to suppress cost pass-through with declining price markups, while strengthening the tendency to suppress wages with increased wage markdowns. The contraction of price markups put downward pressure on prices, and the expansion of wage markdowns put downward pressure on wages, leading to the entrenchment of the behavior and mindset based on the assumption that wages and prices will not increase easily.

During this period, in the Japanese economy as a whole, including among workers, there was a growing tendency to prioritize the stability of regular employment over wage increases. There were also widespread moves among firms to curb fixed total labor costs by increasing the number of non-regular employees (part-time employees). The suppression of wages associated with these efforts is thought to have resulted in a stronger tendency toward price rigidity, even from a cost standpoint. Thus, the behavior and mindset based on the assumption that wages and prices will not increase easily became entrenched, accompanied by changes in social structure and the behavior of firms and workers.

Chart 1-1-23: Price Markups and Wage Markdowns



Sources: Research Institute of Economy, Trade and Industry; Ministry of Finance; Cabinet Office; Development Bank of Japan, "Corporate Financial Databank"; Aoki et al. (2024).
Note: Price markups are the ratio of sales price to marginal cost. Wage markdowns are the ratio of marginal revenue product of labor to wages. Figures for fiscal 2023 are April-December averages.

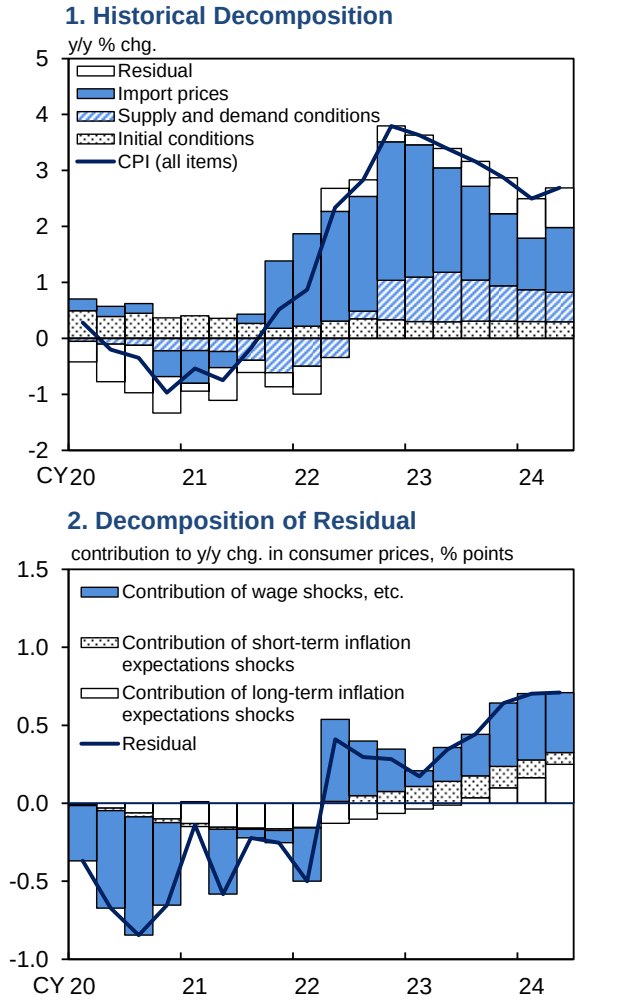
[66] For details of the analysis methodology and results, see Aoki et al. (2024). In that paper, the estimation is based on the method proposed by Aoki, Hogen, and Takatomi (2023).

Recent Changes

The results of the various analyses above also show that this behavior and mindset with regard to wages and prices has recently begun to change.

First, underlying inflation rates have recently begun to rise along with wages, according to all measurements, suggesting that the situation with wages and prices less likely to rise is changing (Charts A4-1, A4-2, and 1-1-27(1)). [67] The background to price developments can be analyzed using the wage-price model of Nakamura et al. (2024), which applies the model in Bernanke and Blanchard (2024a) to Japan, as part of the international project of Bernanke and Blanchard (2024b). The results show that wage hikes have recently been pushing up consumer prices, in addition to shocks originating in goods markets, such as import price hikes (Chart A4-4).[68, 69] In fact, in the spring 2024 price revision, there were price hikes in many services items at the beginning of the period (services prices in Japan are often revised in April and October at the beginning of each period), as wage hikes spilled over.[70] These changes are spreading to firms that had for a long time maintained a cautious stance

Chart A4-4: Historical Decomposition of CPI



Sources: Ministry of Internal Affairs and Communications; Ministry of Health, Labour and Welfare; Cabinet Office; Bank of Japan; QUICK, "QUICK Monthly Market Survey <Bonds>"; Consensus Economics Inc., "Consensus Forecasts"; Bloomberg; Google Trends.
Notes: 1. Decompositions are based on the model in Nakamura et al. (2024).
2. In the upper chart, "import prices" refers to the contribution of energy prices and food prices. "Supply and demand conditions" refers to the contribution of productivity growth, supply shortages, and labor market slack. In the lower chart, "contribution of wage shocks, etc." refers to the contribution of wage shocks and price inflation shocks.

[67] For details of recent developments in underlying inflation, see Ozaki et al. (2024).

[68] Bernanke and Blanchard (2024a) construct a wage-price model to capture the background of global high inflation since the spread of the COVID-19. Central banks, including the Bank of Japan, have responded to their call to base each country's model on the Bernanke and Blanchard model, taking into account the specific circumstances of each country. For details, see Nakamura et al. (2024). Bernanke and Blanchard (2024b) aggregate these results.

[69] Chart A4-4 shows the results in Nakamura et al. (2024). For the most recent period, the figures are estimated using recent data. (1) shows the result of the historical decomposition, which indicates that food prices and others have pushed up overall prices. In addition, as shown in (2), the part that cannot be explained by the average relationship in the past (the residual) explained much of the recent fluctuation in prices, and decomposition of the residual shows that wage shocks have had a large contribution.

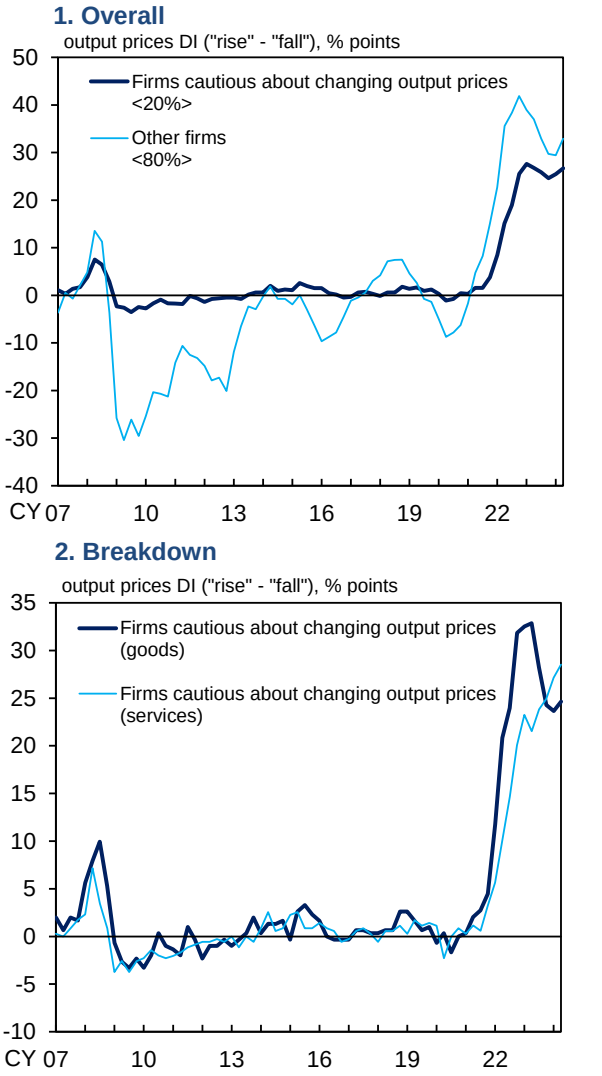
[70] For details of the price increase at the beginning of the period in spring 2024 and recent changes in firms' behavior, see Ozaki, Yagi, and Yoshii (2024).

toward changing output prices (Chart A4-5).

Next, the cost of price adjustments and the degree of kink in the demand curve have recently declined or contracted to levels similar to those seen in the early 1990s, suggesting that the long-standing practice of price rigidity and price fixing through strategic complementarities among firms may have recently weakened (Chart A4-3). [71] Furthermore, signs that the rise of wage markdowns has reached its peak have been observed recently, suggesting that workers' ability to negotiate wages may be increasing, mainly due to labor shortages (Chart 1-1-23). In recent labor-management wage negotiations, the interests of firms and workers appear to be changing, with a decrease in emphasizing the need to maintain employment. In this regard, the situation in Japan's labor market, where low employment mobility had been an issue, is changing, with the growing market for job changers due to demographic changes, and the upward pressure on wages is strengthening (Chart A4-6).[72]

In addition to the changes described above, the substantial increase in input prices, including energy prices, has triggered a shift in the practices and thinking of various economic entities.[73] It is important to take into consideration a range of aspects when observing changes in the behavior and mindset of firms and households.[74]

Chart A4-5: Change in Firms' Price-Setting Stance



Source: Bank of Japan.
Note: Based on the *Tankan* (all enterprises). Figures for firms cautious about changing output prices are for firms that for at least about 95 percent of the period from 1991 to 2019 replied that their output prices were "unchanged." In panel 1, figures in angular brackets show the share in all firms. In panel 2, figures for "firms cautious about changing output prices (goods)" are for manufacturing firms, while those for "firms cautious about changing output prices (services)" are for nonmanufacturing firms.

[71] In this regard, Ikeda et al. (2023) have analyzed the pricing stance of firms using individual firms' data from the Bank of Japan's Tankan survey and have found that firms that had not changed their stance on setting sales prices over a long period of time were changing their behavior in the current phase.

[72] For details, see Ikeda et al. (2024).

[73] Regarding price trends during the outbreak of COVID-19, the Bank held a series of three workshops on "Issues Surrounding Price Developments during the COVID-19 Pandemic." For further details, see Bank of Japan Monetary Affairs Department (2022), Bank of Japan Research and Statistics Department (2022), and Bank of Japan Monetary Affairs Department and Research and Statistics Department (2023).

[74] For details, see Fukunaga, Hogen, and Ueno (2024).

Publications in the Broad-Perspective Review Series

Aoki, Kosuke, Yoshihiko Hogen, Yojiro Ito, Kenji Kanai, and Kosuke Takatomi (2024), "Determinants of Price Markups at Japanese Firms and Implications for Productivity," Bank of Japan Working Paper Series, No.24-E-15.

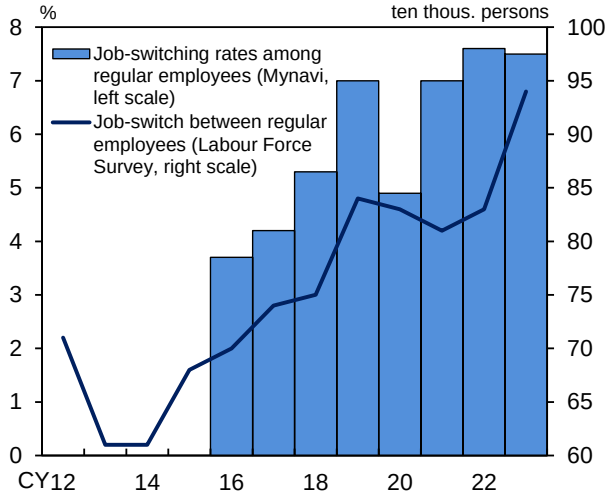
Furukawa, Kakuho, Yoshihiko Hogen, Kazuki Otaka, and Nao Sudo (2024), "On the Zero-Inflation Norm of Japanese Firms," IMES Discussion Paper Series, No.2024-E-15, Institute for Monetary and Economic Studies, Bank of Japan.

Fukunaga, Ichiro, Yoshihiko Hogen, and Yoichi Ueno (2024), "Japan's Economy and Prices over the Past 25 Years: Past Discussions and Recent Issues," Bank of Japan Working Paper Series, No.24-E-14.

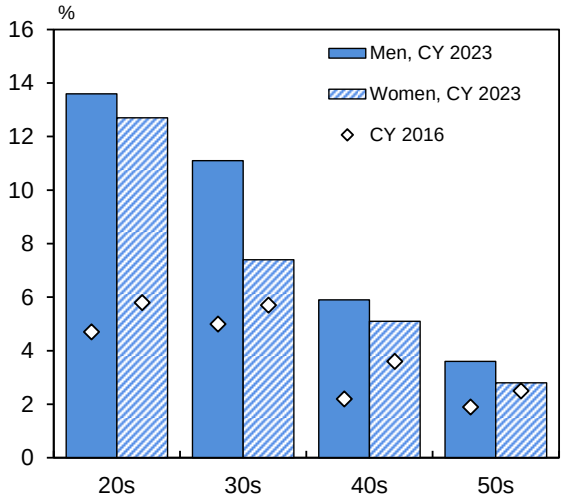
Ueno, Yoichi (2024), "Linkage between Wage and Price Inflation in Japan," Bank of Japan Working Paper Series, No.24-E-7.

Chart A4-6: Expansion of Job Switching

1. Developments



2. Job-Switching Rates among Regular Employees by Age



Sources: Mynavi, "Job Change Trends Survey 2024 (2023 Results)"; Ministry of Internal Affairs and Communications.
Note: Job-switching rates are the shares of regular employees in their 20s to 50s who switched jobs in the past year.

Appendix 5: Firms' Wage- and Price-Setting Behavior: Evidence from the Survey

The Bank conducted a large-scale survey of firms through its Head Office, branches, and local offices to deepen its understanding of the background to Japan's prolonged low price and wage inflation since the mid-1990s (*Survey regarding Corporate Behavior since the Mid-1990s*). This survey covered around 2,500 non-financial corporations, from a wide range of industries, and from large firms to small and micro firms.[75]

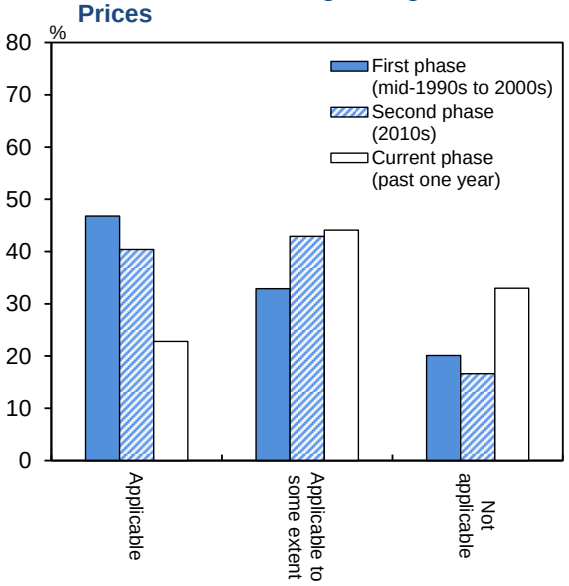
To examine changes in corporate behavior since the mid-1990s, firms were asked to respond to questions by dividing this period into three phases, namely, (1) the period from the mid-1990s to the 2000s, (2) the 2010s, and (3) the last year of the survey period. Corporate managers or executives of more than half of the firms that responded were also interviewed by the Bank's staff.[76]

Wage- and Price-Setting Behavior since the Mid-1990s

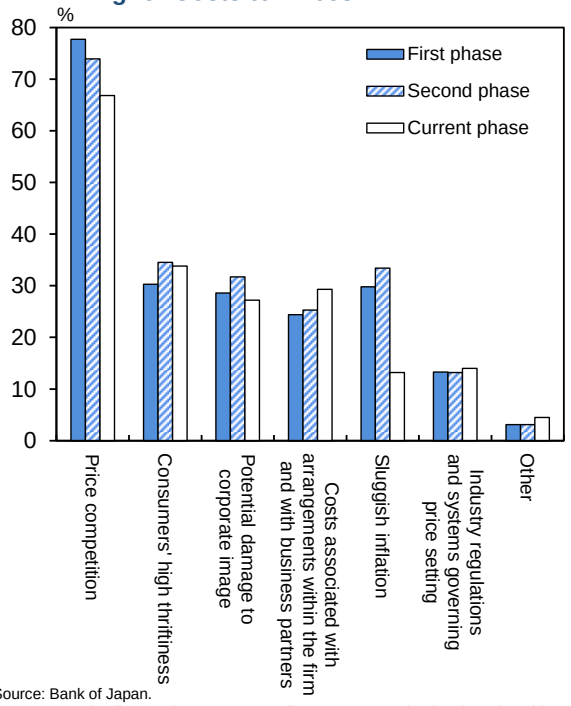
As for firms' price setting, the survey shows that about 80 percent of firms felt they had difficulty in passing on costs to prices in the period from the mid-1990s to the 2000s (Chart 1-1-28(1)). The survey suggests that intensified price competition across a wide range of industries significantly restrained firms from passing on costs to prices as

Chart 1-1-28: Price Setting Behavior as Observed in a Corporate Survey

1. Difficulties in Passing on Higher Costs to Prices



2. Reasons for the Difficulties in Passing on Higher Costs to Prices



Source: Bank of Japan.
Notes: 1. For details, see the *Survey regarding Corporate Behavior since the Mid-1990s*.
2. In the second chart, figures are shares of firms that responded "applicable" or "applicable to some extent" in the first chart. Up to three reasons were allowed.

[75] The survey was conducted from November 2023 to February 2024. The breakdown of the 2,256 respondents by firm size was as follows: 529 large firms (capital of 1 billion yen or more); 393 medium-sized firms (capital of 100 million yen to less than 1 billion yen); 782 small firms (capital of 20 million yen to less than 100 million yen); and 552 micro firms (capital of less than 20 million yen). By sector, these respondents comprised 638 manufacturers and 1,618 nonmanufacturers.

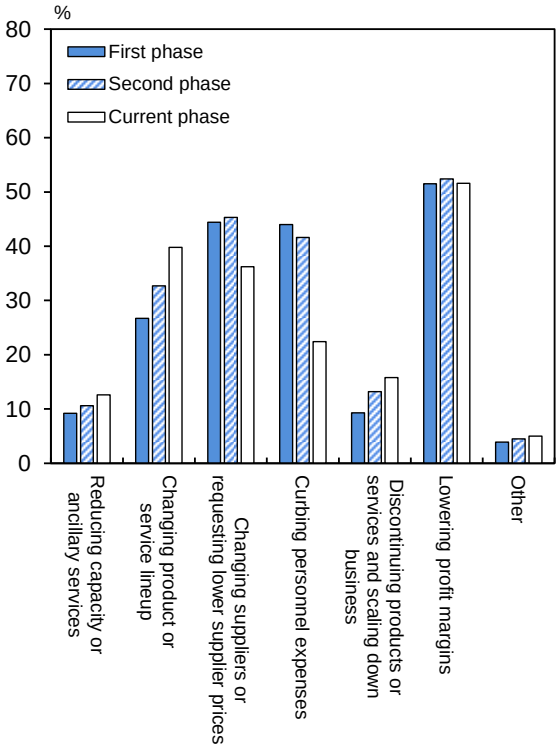
[76] The survey covered topics other than wage- and price-setting behavior. See Appendix 1 for the firms' views on the Bank's conduct of monetary policy over the past 25 years, and Appendix 15, for their views on a state in which both wages and prices will not increase easily and other issues. For details of the survey, see Bank of Japan (2024a).

consumers had a stronger preference for lower prices and firms rapidly became more inclined to reduce costs in response to large adverse shocks such as the bursting of the bubble and the financial crisis in Japan during the late 1990s (Chart 1-1-28(2)). In addition, it seems that, among manufacturers, passing on costs to prices became more difficult due to the cost of arrangements within the firm and with business partners associated with multilayered transaction structures, involving supply chains and the relationship between main contractors and subcontractors. Concerns about the potential damage to corporate image caused by price rises were also likely to have contributed to more cautious pricing behavior among nonmanufacturers, who often engage in direct transactions with consumers. Asking how firms addressed cost increases when it was difficult to pass on costs to prices, it is found that many firms maintained their prices while absorbing cost increases mainly by lowering profit margins and curbing personnel expenses (Chart A5-1(1)). It is also implied that pressure to restrain prices was exerted firms on small and micro firms located relatively upstream in the supply chain as large firms became more active in changing suppliers or requesting lower supplier prices (Chart A5-1(2)).

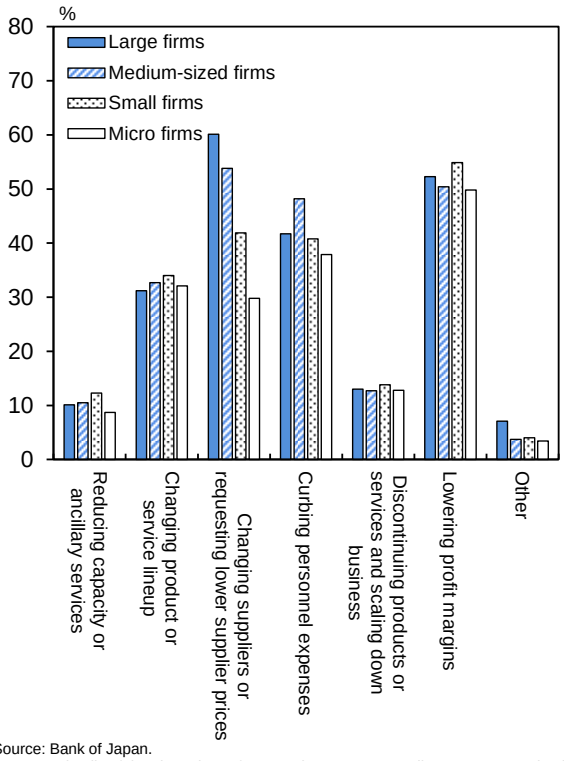
As for firms' wage setting behavior, the survey shows that about 80 percent of firms curbed increases in basic wages of regular workers, i.e. base pay rises, in the period from the mid-1990s to the 2000s (Chart A5-2). It seems that this behavior was backed by the fact that firms found it difficult to pass on increases in personnel expenses to their selling prices but were able to secure regular workers even without having to raise wages. During this period, given the low economic growth after the burst of the bubble and the increase in the number of non-regular workers,

Chart A5-1: Measures Adopted to Address Cost Increases

1. All Sizes



2. By Firm Size in the Second Phase



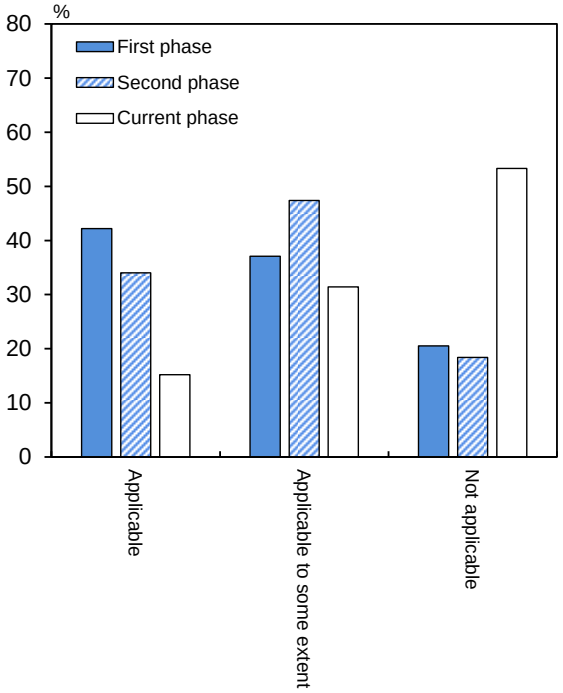
Source: Bank of Japan.
Note: For details of the charts hereafter, see the *Survey regarding Corporate Behavior since the Mid-1990s*. Figures are shares of firms that responded "applicable" or "applicable to some extent" in Chart 1-1-28(1). Up to three measures were allowed.

workers reinforced their stance of prioritizing employment stability over wage increases (Chart A5-3). The increase in the social security burden, reflecting the declining and aging population, was an additional factor in firms tightening their stance on wage restraints.

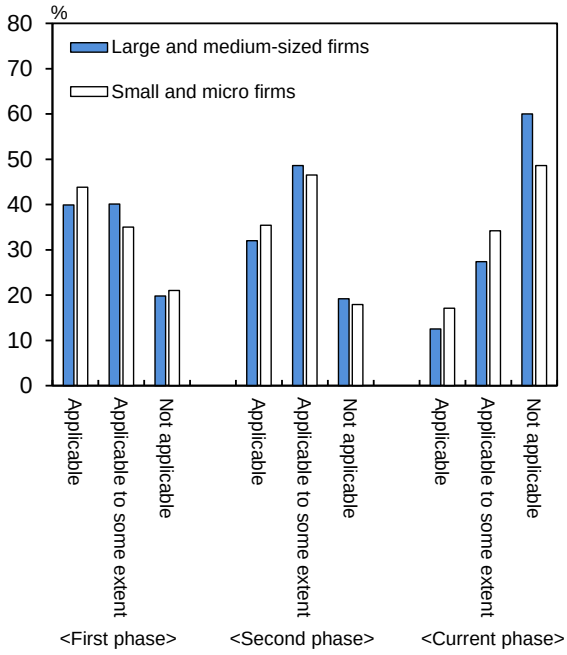
The survey results reveal that, since the mid-1990s, developments in response to various adverse shocks, such as consumers' increased preference for lower prices, triggered an intensification of firms' cautious wage- and price-setting behavior, and created a vicious cycle that led to the entrenchment of consumers' preference for lower prices. Moreover, firms' cautious wage- and price-setting behavior showed no significant changes in the 2010s, when the economy improved moderately.

Chart A5-2: Sluggish Growth in Regular Workers' Basic Wages

1. All Sizes



2. By Firm Size



Source: Bank of Japan.

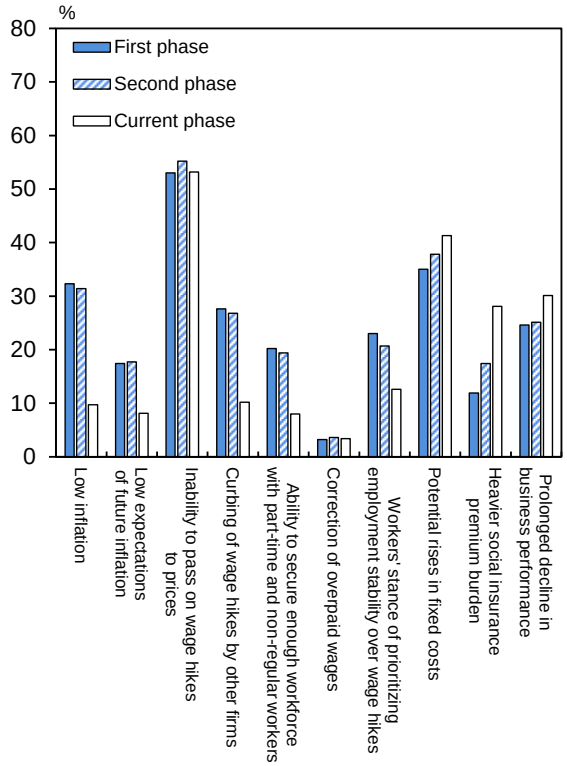
Recent Changes in Wage- and Price-Setting Behavior

The survey results also show that firms' wage- and price-setting behavior has gradually become more proactive recently.

As for price-setting, over 80 percent of firms suggests that difficulty in passing on costs to prices has eased (Chart A5-4). Amid a significant rise in overall prices triggered by cost-push pressure following a substantial rise in import prices, firms from a wide range of industries and sizes point out that they are being pushed to pass on costs to prices given the growing recognition that price rises are unavoidable and the increasing number of price hikes by their competitors. Interviews with firms also confirm that, although many point out that it is more difficult to pass on personnel expenses compared to raw material costs, there is a growing trend to pass on higher personnel expenses to selling prices, triggered in part by the successful price pass-on of higher import prices.

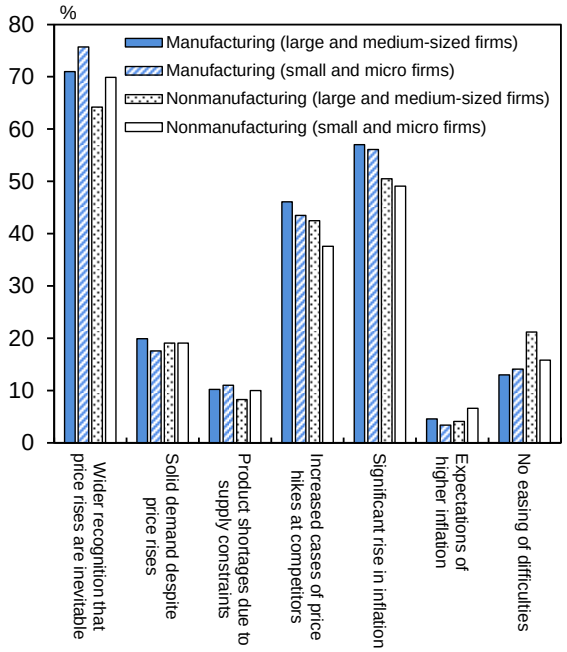
Regarding wage-setting, around 90 percent of firms indicate an active stance toward wage increases (Chart A5-5). It is confirmed that these changes have been prompted by rapidly growing concerns across a wide range of industries and firm sizes about securing workers, against a background of increasing difficulty in recruiting new graduates and an increase in job turnover, especially among young people. Under these circumstances, and partly due to a significant rise in prices, there is a growing trend towards wage increases among Japanese firms.

Chart A5-3: Reasons for Curbing Base Pay Increases



Source: Bank of Japan.
Note: Figures are shares of firms that responded "applicable" or "applicable to some extent" in Chart A5-2. Up to five reasons were allowed. Some reasons are not presented on the chart.

Chart A5-4: Reasons for the Easing of Difficulties in Passing on Higher Costs to Prices

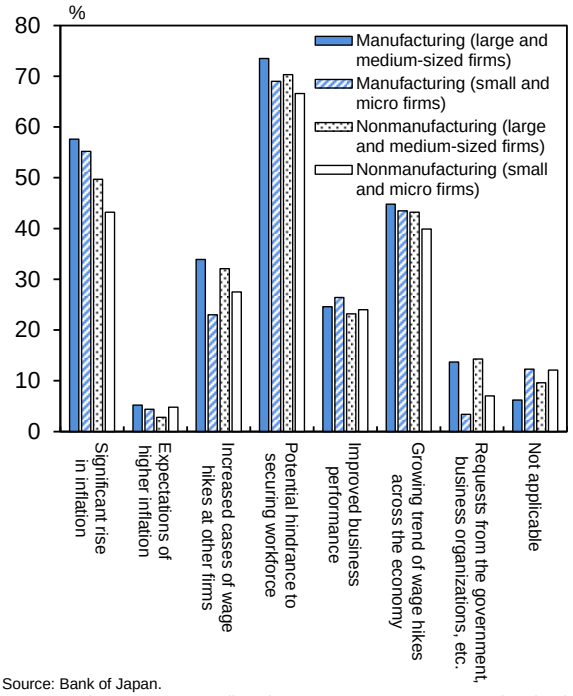


Source: Bank of Japan.
Note: Up to three reasons were allowed. Some reasons are not presented on the chart.

Publication in the Broad-Perspective Review Series

Bank of Japan (2024a), *Results of the Survey regarding Corporate Behavior since the Mid-1990s*, Regional Economic Report Annex.

Chart A5-5: Reasons for Shifts in Firms' Stance toward Raising Wages



Source: Bank of Japan.
Note: Up to three reasons were allowed. Some reasons are not presented on the chart.

Appendix 6: Exchange Rate Developments over the Past 25 Years

Over the past 25 years, the exchange rate in Japan has fluctuated significantly. This appendix reviews the background to the exchange rate developments, mainly from the perspective of market participants, and also looks at the relationship between exchange rates and monetary policy.

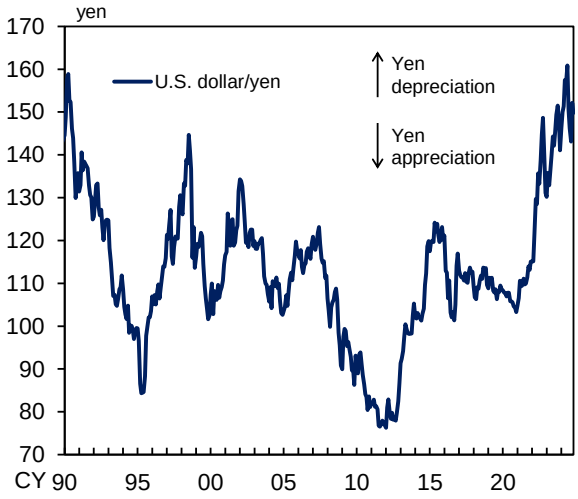
Exchange Rate Developments over the Past 25 Years

After reaching 80-90 yen per dollar in 1995, the yen depreciated to almost 150 yen per U.S. dollar around 1998, against the background of the financial crisis in Japan and the Asian currency crisis (Chart 1-1-12). Thereafter, the yen appreciated broadly and, as the impact of the crisis eased, remained at around 100-120 yen for much of the period through the mid-2000s.

From around 2007, momentum increased in the yen's appreciation as the impact of the Global Financial Crisis became more severe. Market participants attributed the appreciation mainly to the following factors: (1) demand for the yen as a safe haven currency rose under the unstable global financial markets stemming from the Global Financial Crisis and the following European debt crisis, and (2) interest rate differentials between Japan and abroad decreased considerably, as interest rates in Japan were already low and there was limited room for further decrease in interest rates, while strong monetary accommodation was introduced in the U.S. and Europe (Chart 1-2-15). Against this backdrop, the yen's appreciation advanced and temporarily hit a high of 70-80 yen per U.S. dollar.

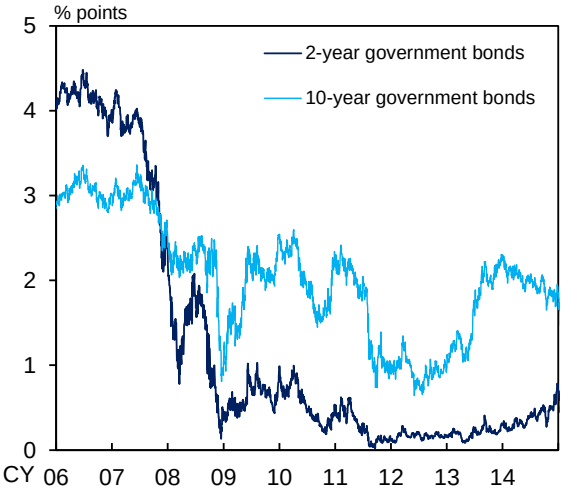
The yen's appreciation then reversed around the end of 2012, and the yen weakened further to 120-130 yen per dollar by around 2015. Market

Chart 1-1-12: Exchange Rate



Source: Bloomberg.
Note: End-of-month values.

Chart 1-2-15: Yield Differentials (United States - Japan)



Source: Bloomberg.

participants attributed the yen's depreciation to some key monetary policy decisions in Japan; namely, the introduction of the price stability target of 2 percent and the subsequent launch and expansion of "Quantitative and Qualitative Monetary Easing." Market participants also pointed to other changes related to the aforementioned two factors: (1) risk-off trades receded as the European debt crisis began to subside, and (2) as a recovery trend in the U.S. economy became more evident, the Federal Reserve adopted a less accommodative stance in 2013, signaling the start of the "tapering" of new asset purchases.

Thereafter, the yen remained at around 100-120 yen per U.S. dollar, with some fluctuations, such as the appreciation in 2016 due mainly to increasing concerns over the slowdown of the Chinese economy. However, the yen depreciated rapidly from 2022 onward, reaching a low of 160 yen per U.S. dollar in 2024. During this period, the Bank maintained its accommodative monetary policy stance, while the Federal Reserve raised its policy rate rapidly as inflation rose well above its target. Market participants pointed out that the widening interest rate differentials resulting from this monetary policy divergence between the two gained attention in the market as a major factor for the depreciation.

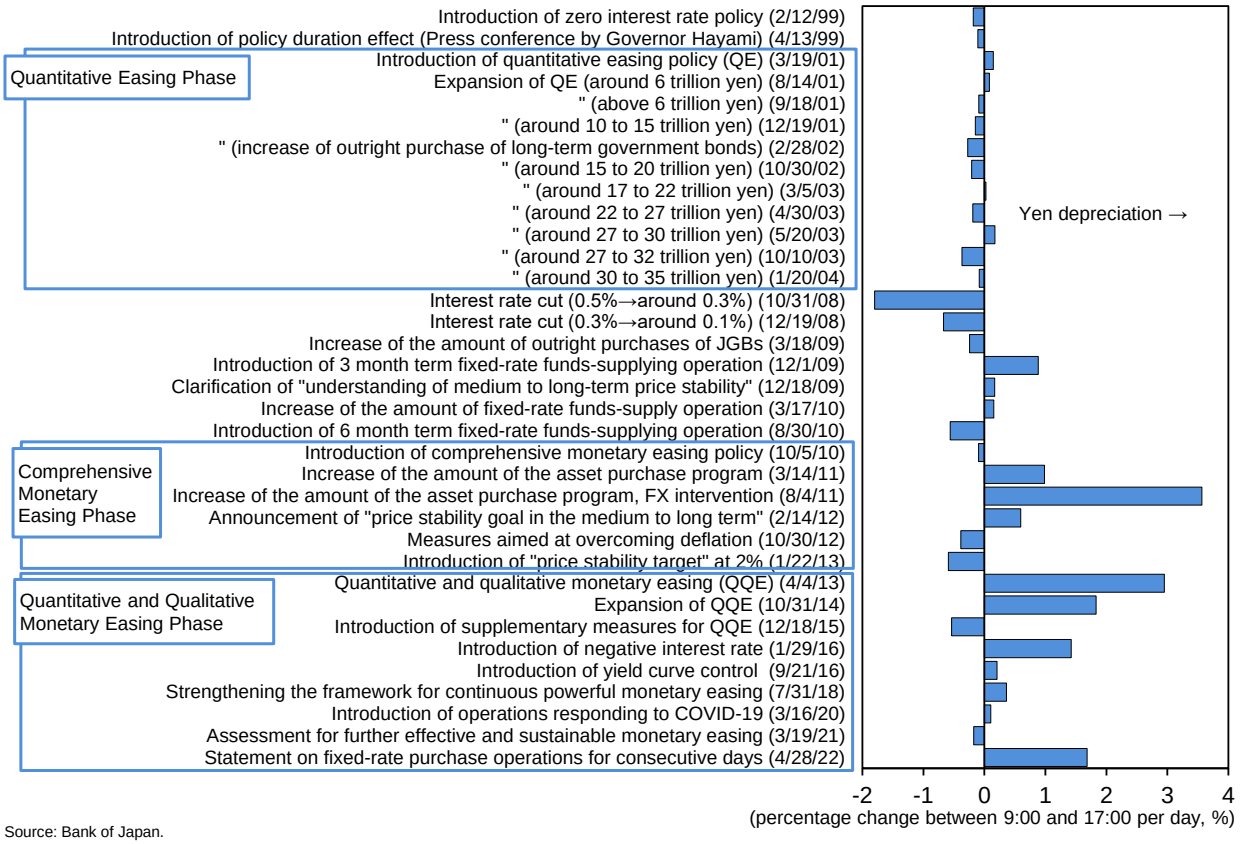
Drivers of Exchange Rate Developments: The Impact of Monetary Policy

Overall, evolving market sentiment between risk-on and risk-off and domestic and foreign monetary policies have generally been perceived as the main drivers of exchange rate developments in the past.

However, it should be noted that the relationship between changes in exchange rates and changes

in either monetary policies or interest rate differentials seems to depend largely on circumstances and to be highly uncertain. Indeed, the response of the U.S. dollar/yen exchange rate to monetary policy changes in Japan over the past 25 years is mixed (Chart A6-1). In this regard, an estimation using monetary policy shocks, which are identified from changes in the yield curve and exchange rate, indicates that the response of the exchange rate to these monetary policy shocks varied significantly, depending on factors such as market trends at the time.[77]

Chart A6-1: U.S. Dollar/yen Price Change on the Day of Monetary Policy Meeting Actions



Source: Bank of Japan.

[77] For details of analytical methods and results, see Ikkatai, Kawamoto and Sakura (2024).

Drivers of Exchange Rate Developments: Purchasing Power Parity and Balance of Payments

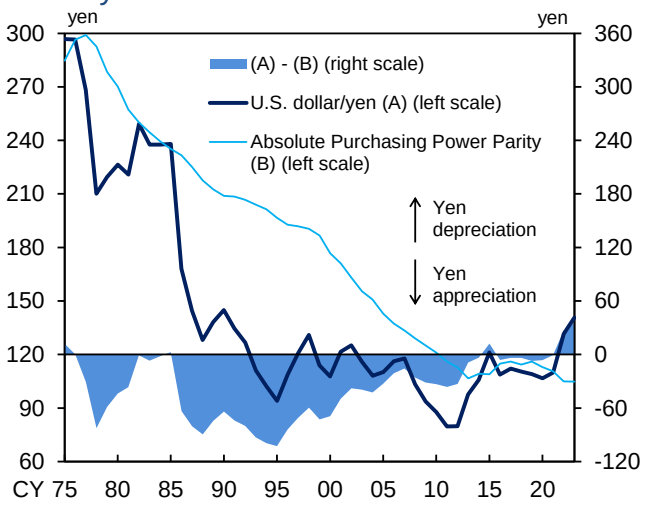
It is often noted that purchasing power parity (PPP) and balance of payments are also important factors in determining long-term trends in exchange rates.

PPP is difficult to estimate and can vary, depending on calculation methodologies. PPP-based exchange rates should therefore be treated with some latitude. With that in mind, the absolute PPP released by the OECD shows the yen's appreciation from the mid-1990s until around 2012-2013, since when it generally leveled off. Comparing this with the actual U.S. dollar/yen exchange rate, from the late 1980s to around 2012, the actual rate was stronger than the OECD-based PPP. Until around 2022, the actual rate and the PPP were at roughly the same level, and thereafter the actual rate became weaker than the PPP suggests (Chart A6-2).

In terms of the balance of payments, Japan has continued to have a large current account surplus. However, the drivers of the surplus have changed significantly.

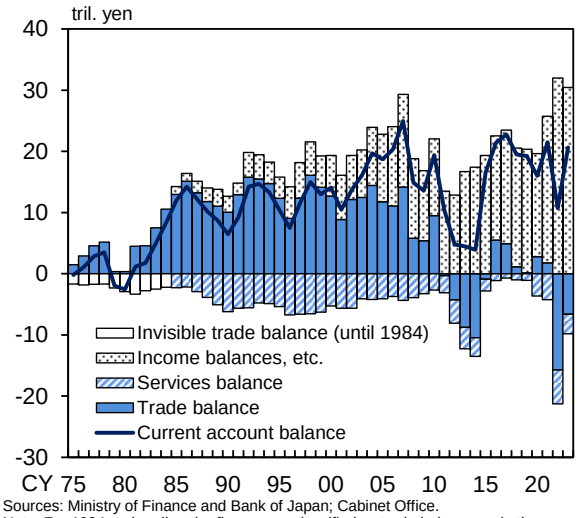
First, until the 2000s, the trade balance surplus was the main driver of the current account surplus. Then, from around 2010, while the income balance surplus widened and became the main factor in the current account surplus, the trade balance turned to near-zero or deficit, mainly due to shifting of production sites to overseas and the expansion of global activities, especially by large companies. The increase in fossil fuel imports after the Great East Japan Earthquake also contributed to the worsening of the trade balance (Chart A6-3). With regard to the balance of services during this period, while the travel

Chart A6-2: Absolute Purchasing Power Parity



Sources: OECD; Bank of Japan.

Chart A6-3: Current Account



Sources: Ministry of Finance and Bank of Japan; Cabinet Office.
Note: For 1984 and earlier, the figures are classified as trade balance and others. The original dollar figures for balance of payments are converted in to yen using the U.S. dollar/yen exchange rate, and are inconsistent with the figures for 1985 and later.

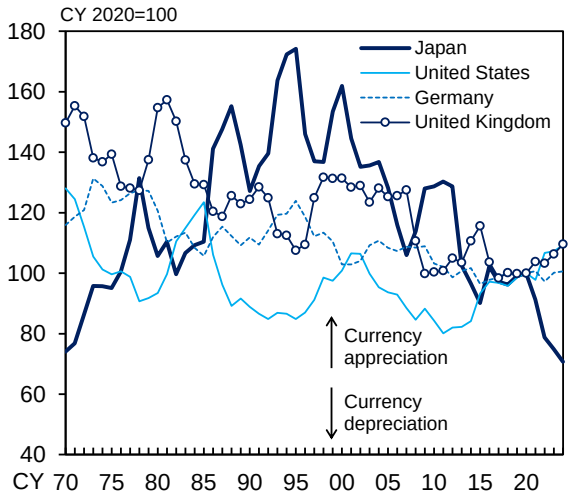
balance surplus has recently expanded, an increase in payments overseas for digital services has often been pointed out. Corporate behavior has changed over the past 25 years in response to evolving international conditions, such as globalization, which may also have affected the long-term trend in exchange rates. From the perspective of capital flows other than the current account balance, market participants have pointed out the possibility that changes in the investment behavior of institutional investors and households with regard to foreign assets may have also affected the exchange rate.

Nominal and Real Exchange Rate

While we have so far focused on nominal exchange rates, the real effective exchange rate, which takes into account domestic and foreign price trends, should also be noted. The real rate suggests that the yen generally continued to appreciate from the 1970s to the mid-1990s, followed by the sustained depreciation seen until now (Chart A6-4).

These real exchange rate developments may have been influenced by a number of factors in the domestic and foreign economies. For example, in addition to differences in the potential growth and productivity of domestic and foreign economies, a variety of other factors can affect the exchange rate, including changes in demand for each currency, the tendency to prefer assets denominated in the home currency when investing (home bias), investors' risk-sharing activities such as currency risk hedging, and fiscal and monetary policy in each jurisdiction. While it is difficult to identify drivers of exchange rate developments, given the large number of trades taking place in foreign exchange markets, some research indicates that the relative productivity of the U.S. and Japanese export sectors contributes to

Chart A6-4: Real Effective Exchange Rate



Source: BIS.
Note: Figures are based on the broad effective exchange rate indices. Figures prior to 1994 are calculated using the narrow indices. Figures for 2024 are January-October averages.

developments in the real exchange rate.[78]

Publications in the Broad-Perspective Review Series

Hogen, Yoshihiko and Naoya Kishi (2024), "On the Balassa-Samuelson Effect in Japan," Bank of Japan Working Paper Series, No.24-E-22.

Ikkatai, Kota, Takuji Kawamoto, and Kenichi Sakura (2024), "Japan's Unconventional Monetary Policy and the Exchange Rate Dynamics," Bank of Japan Working Paper Series, No.24-E-23.

[78] See Hogen and Kishi (2024).

Appendix 7: Assessment of the Impact of Monetary Policy on Expectations

Since the introduction of Quantitative and Qualitative Monetary Easing, in addition to lowering short- and long-term nominal interest rates, large-scale monetary easing has been expected to raise inflation expectations by strongly and clearly committing to the price stability target of 2 percent, thereby reducing the real cost of financing through the "expectations channel" (forward-looking expectations formation). This appendix reviews previous research on the effects of monetary policy on expectations and examines how forward-looking expectations formation has affected price fluctuations.

Review of the Literature

It has long been acknowledged that a central bank's future policy stance plays a key role in shaping economic agents' expectations (Chart A7-1). [79] In recent years, many studies have emphasized the fact that a central bank's monetary policy stance and communication are key factors influencing the formation of expectations. [80] Following the Global Financial Crisis, as nominal interest rates approached their effective lower bound in many countries, the importance of managing expectations through monetary policy increased, and central banks worldwide enhanced their communication strategies. For example, the Federal Reserve Board (FRB) indicated its strategy for conducting large-scale asset purchases, while the European Central Bank (ECB) signaled its intention to fully utilize unconventional monetary policies in addition to their operational stance on policy rates. These measures were aimed at influencing the

Chart A7-1: Discussions in Academia on Influencing Expectations

Effects of Monetary Policy on "Influencing Expectations"	
Hawtrey (1938)	If the effect of raising the official discount rate is not brought about, people will anticipate that the increase will persist until the effect occurs.
Mishkin (2004)	The transparency and communication of central banks have benefits in the formation of expectations.

Perspective under Effective Lower Bound of Interest Rate	
Krugman (1998)	To escape from a liquidity trap, it is necessary to adopt an inflation target.
Bernanke (2000)	Theory and practice suggest that announcements can sometimes affect expectations.
Sims (2004)	Under the effective lower bound of nominal interest rates, central banks have no tools to affect inflation. Influencing expectations is unlikely.

[79] See Hawtrey (1938).

[80] For example, Mishkin (2004) emphasizes the importance of the role played by the transparency and communication of central banks in shaping expectations.

expectations of economic entities.

However, there are varying views on whether monetary policy can effectively raise expectations under the constraint of the effective lower bound of nominal interest rates. On the one hand, the view that monetary policy can influence expectations is supported both theoretically and in practice, with some advocating for the adoption of an inflation-targeting framework even in deflationary or low-inflation environments.[81] On the other hand, some argue that when nominal interest rates are constrained by the effective lower bound, central banks lack sufficient tools to influence inflation, making it difficult to influence expectations.[82]

These discussions suggest that, in assessing the influence of monetary policy on expectations, whether unconventional monetary policy measures are effective for monetary easing is an important issue. Moreover, there is also an argument that, considering the informational constraints faced by households and firms in making economic decisions, as well as the actual price-setting processes of firms, it is difficult to conclude that inflation expectations affect economic activity, including overall price levels.[83]

Developments in Inflation Expectations

A review of long-term developments in inflation expectations in Japan reveals the following (Chart A7-2).

From the late 1990s to the early 2000s, as nominal interest rates approached their effective lower bound, private-sector inflation expectations gradually declined. In the mid-2000s, inflation expectations increased temporarily as the

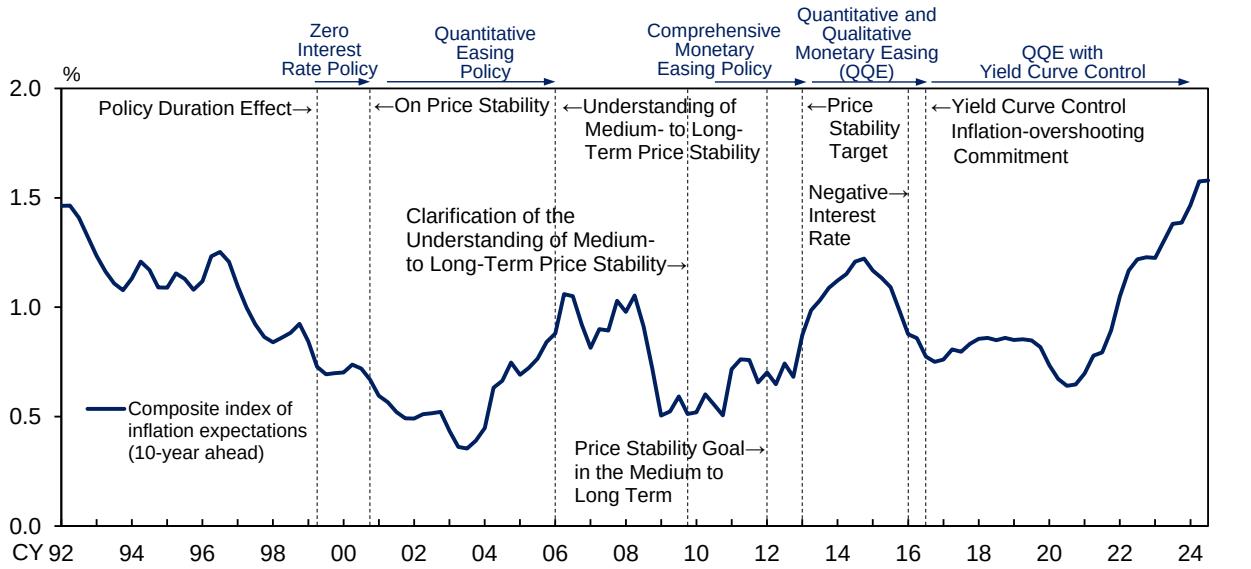
[81] For details, see Krugman (1998) and Bernanke (2000).
[82] See, for example, Sims (2004).
[83] See Yoshikawa (2022).

increase in global commodity prices spilled over into consumer prices, in turn affecting inflation expectations. However, they subsequently declined during the economic downturn that followed the Global Financial Crisis.

After the introduction of the price stability target of 2 percent in 2013, inflation expectations began to rise again. Nevertheless, by the mid-2010s, the decline in oil prices caused a slowdown in consumer price growth, and inflation expectations decreased, influenced significantly by the presence of adaptive expectations formation, remaining around 1 percent.

Since 2020, there has been a gradual increase in inflation expectations, which has been driven by rising energy and food prices after the COVID-19 pandemic, as well as tighter labor market conditions.

Chart A7-2: Unconventional Monetary Policy and Inflation Expectations



Sources: Bank of Japan; Bloomberg; Consensus Economics Inc., "Consensus Forecasts"; QUICK, "QUICK Monthly Market Survey <Bonds>."
Note: Based on the first principal component extracted from the following six indicators: two indicators for households from the *Opinion Survey on the General Public's Views and Behavior* (for qualitative and quantitative questions), one indicator for firms from the *Tankan*, and three indicators for economists and market participants from the QUICK Survey, the Consensus Forecasts, and data based on inflation swap rates. Data for firms before 2014 are obtained from Nakajima (2023).

Empirical Analysis of the Impact on Expectations

The impact of inflation expectation shocks, particularly those exogenous shocks arising from monetary policy announcements, on price developments in Japan are examined, using a time-varying parameter vector autoregressive (TVP-VAR) model (Charts A7-3(1) and A7-3(2)).[84] Specifically, based on the methodology proposed by Diegel and Nautz (2021), exogenous demand shock, supply shock, shadow rate shock and medium- to long-term inflation expectation shock are identified through the examination of the following four relevant indicators: the output gap, CPI (less fresh food), shadow rates, and long-term inflation expectations. The impact of these shocks on price fluctuations over the past 25 years is then examined, using impulse response functions.[85]

If forward-looking expectations formation influences inflation expectations and price fluctuations, it would be expected that (1) the exogenous shocks to inflation expectations occurred during this period, and (2) they exerted upward pressure on prices. Conversely, in periods where prices were expected to decline, shocks to inflation expectations would be expected to exert downward pressure on prices. Considering the significant changes in Japan's economic structure and price environment over the past 25 years, the TVP-VAR model incorporates the possibility that the relationship among variables – for example, between inflation expectations and price developments – may evolve over time, and this is a key feature of the analysis.

The results of the impulse response analysis

[84] For details of the estimation methods and results, see Kaihatsu, Nakano, and Yamamoto (2024).

[85] The shadow rates are calculated using the Imakubo and Nakajima (2015) model. For details of the shadow rates, see Appendix 10.

Chart A7-3: Effects of Inflation Expectation Shocks

1. Model Overview

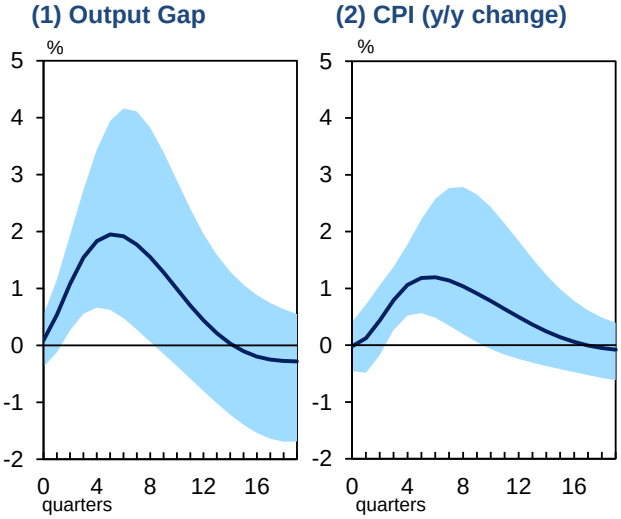
- Estimate a time-varying parameter vector autoregressive model (TVP-VAR) with the following four variables.
  1. Output gap
  2. CPI (year-on-year rate of change)
  3. Shadow rate
  4. Composite index of inflation expectations (10 years ahead)
- Estimation period: 1983/Q1 to 2023/Q4
- Lag length: 2
- Identify structural shocks using sign-restriction in table 2.

2. Sign-Restrictions

Variables	Structural shocks			
	Demand	Supply	Interest rate	Expectation
Output gap	+	+	+	
CPI	+	-	+	
Shadow rate			-	
Inflation expectation				+

Note: "+" indicates a response in the same direction as the shock, while "-" indicates response in the opposite direction.

3. Impulse Response Functions to Inflation Expectation Shocks



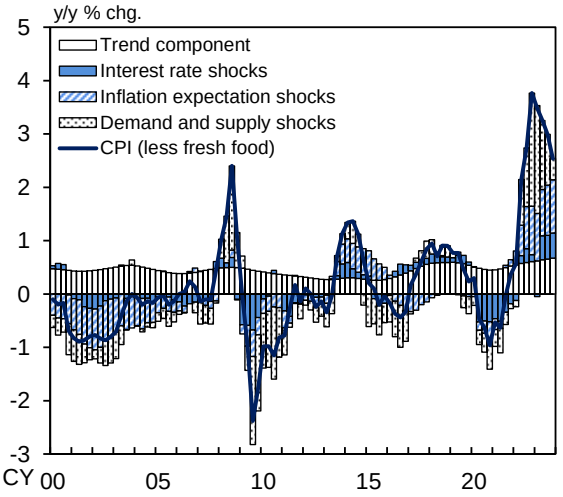
Sources: Ministry of Internal Affairs and Communications; Bank of Japan; Bloomberg; Consensus Economics Inc., "Consensus Forecasts"; QUICK, "QUICK Monthly Market Survey <Bonds>."
Note: The figures show the average impulse response functions to one standard deviation positive inflation expectation shocks over the estimation period. The shocks occur at period 0. The shaded areas represent the 68% credible intervals.

indicate that, in Japan, exogenous medium- to long-term inflation expectation shocks contribute to improving the output gap through lower real interest rates and also have an upward impact on actual inflation (Chart A7-3(3)). This result suggests that the "expectations channel," assumed to be a transmission mechanism of large-scale monetary easing, has been effective in Japan.

Furthermore, the decomposition of price fluctuations shows that changes in medium- to long-term inflation expectations have been one of the factors influencing actual inflation in Japan since the 1990s. Specifically, negative medium- to long-term inflation expectation shocks, in addition to negative demand and supply shocks, contributed to persistent downward pressure on prices, with declining inflation expectations generating deflationary pressure, through the first half of the 2000s (Chart 1-3-7). After the introduction of the price stability target of 2 percent and the large-scale monetary easing in 2013, inflation expectations shifted to exert upward pressure on prices, becoming one of the factors that contributed to a situation where Japan's economy is no longer in deflation. These results suggest that the introduction of the price stability target of 2 percent and the large-scale monetary easing in 2013 has had a certain degree of success in shifting expectations, indicating the effectiveness of forward-looking expectations formation.

However, the analysis also shows that the inflationary impact of exogenous inflation expectation shocks was not sufficient to bring inflation to the 2 percent target. Inflation and inflation expectations experienced an initial increase after 2013, and later declined due to emerging factors, such as falling oil prices. This

Chart 1-3-7: Historical Decomposition of CPI



Sources: Ministry of Internal Affairs and Communications; Bank of Japan; Bloomberg; Consensus Economics Inc., "Consensus Forecasts"; QUICK, "QUICK Monthly Market Survey <Bonds>."
Note: The CPI figures exclude the effects of consumption tax hikes, etc. For details on the estimation method, see Appendix 7 and Kaihatsu, Nakano and Yamamoto (2024).

suggests that, under the strong persistence of behavior and a mindset based on the assumption that wages and prices will not increase easily – meaning that past inflation developments heavily influence the formation mechanism of inflation expectations – the effect of large-scale monetary easing in shifting expectations has not been effective enough to anchor inflation expectations at the price stability target of 2 percent. This difficulty in influencing expectations can be considered one of the major factors behind the more limited impact than initially anticipated of the large-scale monetary easing.

Meanwhile, during this period, no relationship was observed between money (money stocks and monetary bases) and prices, as would be expected under the simple quantity theory of money (Chart 1-3-15).

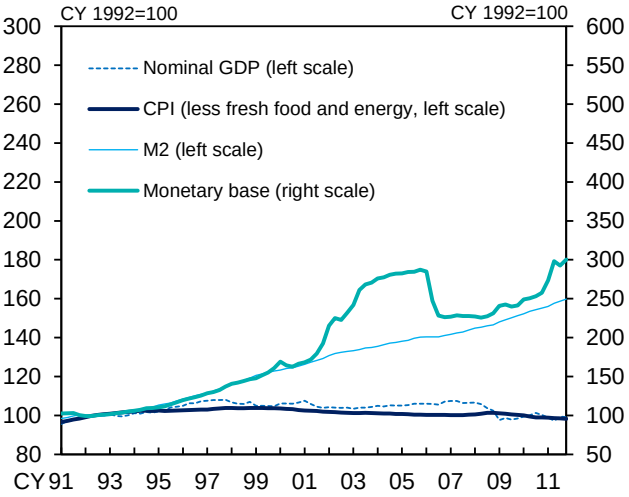
Empirical Analysis of the Impact of Past Price Developments on Inflation Expectations

When considering the formation mechanism of long-term inflation expectations in Japan, it is important to account for the influence of past price developments on expectations.

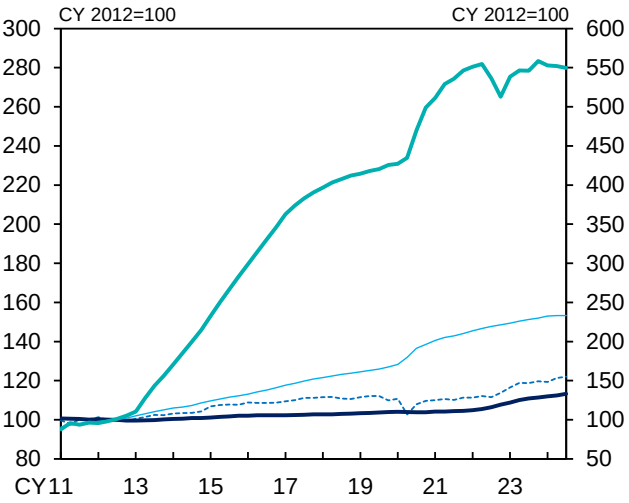
In this regard, this section conducts an analysis using the Bank's large-scale macroeconomic model (Q-JEM). [86, 87] The analysis estimates multiple patterns of forecast values for medium- to long-term inflation expectations, assuming different models for the formation mechanism of inflation expectations within Q-JEM, and then examines the developments in their forecast

Chart 1-3-15: Money, Prices, and Nominal GDP

1. Before CY 2012



2. From CY 2011



Sources: Ministry of Internal Affairs and Communications; Cabinet Office; Bank of Japan.
Notes: 1. The CPI figures are staff estimates and exclude mobile phone charges and the effects of consumption tax hikes, policies concerning the provision of free education, and travel subsidy programs.
2. Figures are seasonally adjusted.

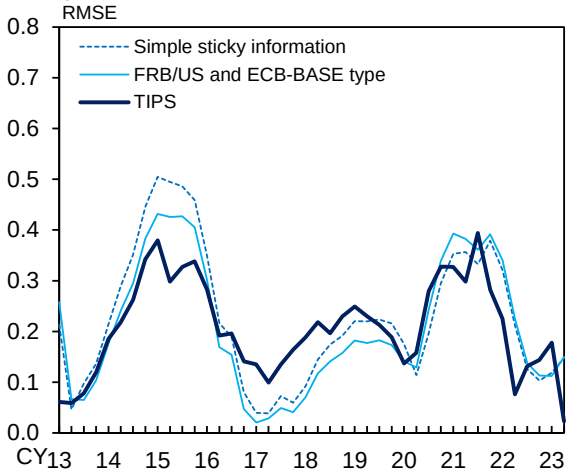
[86] Q-JEM (Quarterly Japanese Economic Model) is a large-scale macroeconomic model with more than 200 variables that are important for analyzing the Japanese economy, including real, financial, and expectations variables. Each equation is estimated using historical data for Japan. For details, see Hirakata et al. (2019).

[87] For details of the method of the analysis and results, see Fukunaga et al. (2024b).

accuracy. In the analysis, the following three models for the formation mechanism of inflation expectations are estimated: (1) the "simple sticky information model," which depends on the inflation target and past inflation expectations; (2) the "FRB/US and ECB-BASE type model," which additionally incorporates past CPI data; (3) the "Trend Inflation Projection System (TIPS) model," which allows the parameters associated with the variables used in the "FRB/US and ECB-BASE type model" – the portion explained by the inflation target and past CPI data – to vary over time. The forecast accuracy of these models is then compared.

The analysis shows that, during the period from 2013 to the second quarter of 2023, there are no substantial differences in the forecast accuracy (root mean squared error, RMSE, of the eight-quarter-ahead forecasts) among the three models, and the size of the errors is not insignificant (Chart A7-4). Moreover, the results also indicate that the forecast accuracy of the models differed depending on the economic phase. This suggests considerable uncertainty regarding how past price developments have influenced the formation of inflation expectations in Japan. As presented above, under the effective lower bound on nominal short-term interest rates, the extent to which central banks can influence private-sector expectations remains a key issue, underscoring the continued importance of understanding the formation mechanism of inflation expectations.

Chart A7-4: Forecast Errors of Inflation Expectations



Sources: Bank of Japan; Fukunaga et al. (2024b), etc.
Notes: 1. The quarterly RMSEs (root mean square errors) are based on out-of-sample forecasts computed by fixing the sample starting period at 1991/Q4 and extending the ending period quarter by quarter from 2012/Q4 in estimating the functions. The horizontal axis shows the forecast starting period.
2. For the forecast starting periods prior to 2022/Q2, the RMSEs are calculated based on the 8-quarter ahead forecasts; for each of the forecast starting periods from 2022/Q3 to 2023/Q2, the RMSEs are calculated based sequentially on the 7- to 4-quarter ahead forecasts.

Publications in the Broad-Perspective Review Series

Fukunaga, Ichiro, Yui Kishaba, Nao Shibata, and Shunichi Yoneyama (2024b), "Uncertainty in the Formation of Inflation Expectations in Japan: An Analysis Using the Macroeconomic Model Q-JEM," mimeo.

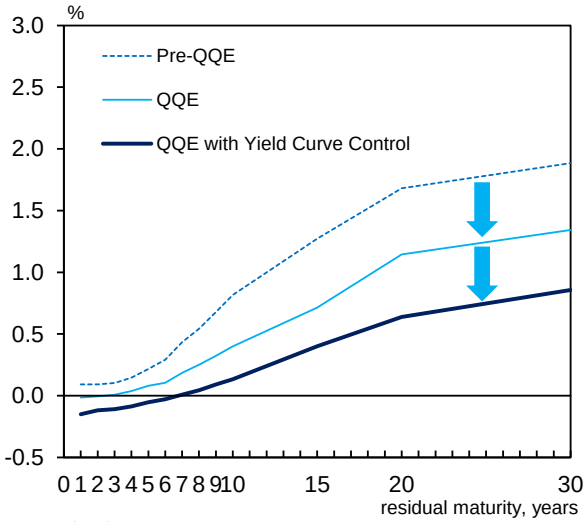
Kaihatsu, Sohei, Shogo Nakano, and Hiroki Yamamoto (2024), "Macroeconomic Impact of Shifts in Long-term Inflation Expectations," Bank of Japan Working Paper Series, No.24-E-18.

Appendix 8: Impact of Large-Scale JGB Purchases on the Formation of the Yield Curve

The Bank's JGB purchases have been implemented as part of large-scale monetary easing and have pushed down the entire yield curve in Japan, likely affecting economic activity and prices (Chart 1-3-8).

Transmission channels through which JGB purchases can affect long-term interest rates include (1) the effect of the daily conduct of JGB purchases on supply and demand in the secondary market (the flow effect) and (2) the effect of an increase in the Bank's JGB holdings on market participants' risk allocation (the stock effect). In addition, (3) the setting of the range of fluctuations for 10-year JGB yield under Yield Curve Control (YCC) would have also affected long-term interest rates.

Chart 1-3-8: Yield Curves



Source: Bloomberg.
Note: Figures for the pre-QQE period are the averages between January 3, 2012, and April 3, 2013, figures for the QQE period are the averages between April 4, 2013, and September 20, 2016, and figures for the QQE with Yield Curve Control period are the averages between September 21, 2016, and March 18, 2024.

Transmission Channels of the Government Bond Purchases to the Yield Curve

The stock effect refers to the channel through which large government bond holding by the central bank affects the risk allocation of private investors in the market, pushing down interest rates of various maturities. Recent empirical studies often report that stock effects are more persistent than flow effects. [88] An increase in the central bank's holdings of government bonds will reduce the overall amount of interest rate risk in the market and then lower interest rates by reducing the term premium consistent with additional risk-taking behavior by market participants. These developments are also likely to be strengthened by market participants' possible anticipation of a large-scale JGB purchase before

[88] See Bernanke (2020), and Sudo and Tanaka (2021), for example.

the central bank actually buys the bonds. This mechanism is referred to as the "announcement effect."

"Quantitative and Qualitative Monetary Easing with Yield Curve Control" (QQE with YCC) was introduced in September 2016, and can be regarded as one type of government bond purchase, as it influences interest rate formation in the market through large-scale JGB purchases. Within this framework, the stock effect is considered to be an important transmission channel that influences interest rates. However, because this framework directly targets the level of the long-term interest rate itself under YCC, its impact differs from that of conventional government bond purchases in several ways. First, under a conventional bond purchase program, which determines the "amount of purchases," when demand for government bonds fluctuates unexpectedly, interest rates also swing; but under YCC, which sets up the "range of fluctuations for the long-term interest rate," the amount of purchases will be determined endogenously in response to demand for government bonds, and interest rate fluctuations will be relatively subdued. Second, if the upper or lower limit is applied to the long-term interest rate under YCC, market participants will take that threshold as given, and then interest rates could stay within the range in a self-fulfilling manner, even without an actual increase or decrease in JGB purchases.[89]

Outline of the Estimation

It is not easy to precisely disentangle and quantify the effect of each transmission channel on long-term interest rates, because various factors affect long-term rates, including JGB purchases by the

[89] Hattori and Yoshida (2023) also report that the 10-year JGB yield became less volatile after the introduction of the YCC.

Bank. With this caveat in mind, in this section, a quantitative evaluation of the effect of these channels is attempted by estimating the following regression model (Chart A8-1). [90]

A regression model is considered where the dependent variable is the 10-year JGB yield, and the explanatory variables include primary economic and financial variables and variables capturing (1) the flow effects, (2) the stock effects, and (3) the effects of setting a range of fluctuations for the 10-year JGB yield under YCC. Specifically, (1) data of the "changes in the Bank's share of JGB holdings" is an explanatory variable to capture the flow effects, and (2) to capture the stock effects, in addition to monthly data of "the Bank's share of JGB holdings," [91] data of "expected changes in the Bank's share" is also included as an explanatory variable to consider the effect of market expectations.[92] In addition, (3) as explanatory variables for capturing the effect of the range of fluctuations under YCC, the "probability of exceeding the upper limit of the fluctuation range" or the "probability of exceeding the level of fixed-rate purchase operations," both of which are calculated from interest rate option price data, is included. If these probabilities increase, the view that the Bank's measures to curb interest rate increases would be strengthened appears to have been factored in, which could influence interest rate formation.[93]

Chart A8-1: Model Specification of Long-Term Interest Rates

10-year JGB yield (%)
＝f (Macroeconomic variables
<10-year U.S. treasury yields, uncollateralized overnight call rate, CPI>,
1. Effect of BOJ's JGB purchases (flow effect)
<monthly change in the share of BOJ's JGB holdings>,
2. Effect of BOJ's JGB holdings (stock effect)
<share of BOJ's JGB holdings, expected change in future share of the BOJ's JGB holdings>,
3. Effect of setting the YCC range
<probability that the targeted long-term yield exceeds the upper bound of the YCC range, etc.>)
+ Constant
Estimation period: January 1997 to March 2024

Note: For details, see Nakazawa and Osada (2024).

[90] Estimation methodologies and their results are detailed in Nakazawa and Osada (2024).

[91] The Bank's share is calculated by summing the interest rate risk of each tranche of the Bank's JGB holdings.

[92] In the estimation, it is assumed that market participants form their expectations by referring to the Bank's releases such as the monthly plan for JGB purchases and the planned amount to be purchased for each maturity tranche. "The expected share of the Bank's JGB holdings" is calculated on the basis of the pace of purchases at each point in time or a hypothetical scenario in which the Bank would continue to purchase JGBs for 2 years according to the releases at that time.

[93] Other explanatory variables include primary economic and financial variables; namely the 10-year U.S. Treasury

Estimation Results and Implications

The estimation results suggest that the explanatory variables above have a statistically significant impact on long-term JGB yields (Chart 1-3-9(1)). For example, in terms of the stock effects, one percentage point increase in "the Bank's share of JGB holdings relative to the total outstanding balance" would push down the interest rate by about 0.02 percent. It should be noted, however, that these results are based on a simple regression model and should be treated with some latitude.

The decomposition of the interest rate movements based on the estimation results suggests that (1) the JGB purchases have gradually pushed down interest rates after the introduction of QQE in 2013, mainly due to the stock effect, and (2) since QQE with YCC was introduced in 2016, the long term interest rate has been lowered by about one percentage point (Chart 1-3-9(2)).[94] This also suggests that the setting of a range of fluctuations under YCC has had the effect of weakening upward pressure on interest rates, which intensified especially around 2022-2023.

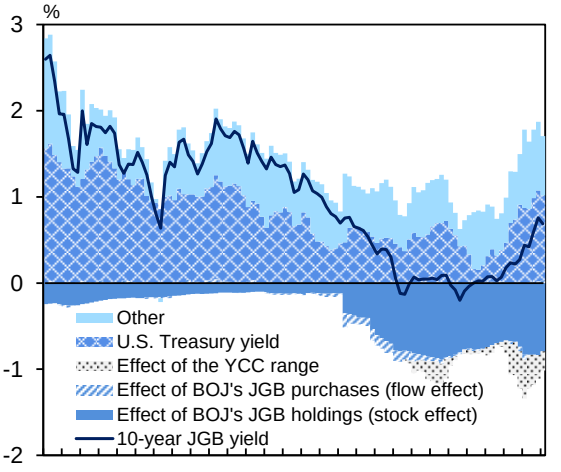
The same regression model with a dependent variable of an interest rate of each maturity suggests that large-scale monetary easing has pushed down not only the 10-year JGB yield but also the entire yield curve (Chart A8-2).

Chart 1-3-9: Impact of the BOJ's JGB Purchases on Interest Rates

1. Estimation Results: Long-Term Interest Rate Models

Dependent variable:	(1) 10-year yield	(2) 10-year yield (sum of estimated coefficients)	(2) 10-year expected short-term interest rate component	(2) 10-year term premium
10-year U.S. Treasury yields	0.238 ***	*0.238*	0.078 ***	0.159 ***
Uncollateralized overnight call rate	0.645 ***	*0.798*	0.798 ***	
CPI (less fresh food and energy)	0.045 ***	*0.082*	0.082 ***	
Monthly change in JGB holdings	-0.141 **	*-0.208*	-0.208 ***	
Risk adjusted share of BOJ's JGB holdings in total	-0.024 ***	*-0.018*	-0.009 ***	-0.009 **
Expectation of future changes in JGB holdings	-0.012 ***	*-0.014*		-0.014 ***
Ratio of fixed-rate purchase operations to JGB issuance	0.000	*-0.002*		-0.002 **
Probability that the upper bound of the YCC range is exceeded	-0.007 *	*-0.046*		-0.046 ***
Probability that the offer rate of fixed-rate purchase operations for consecutive days is exceeded	-0.021 ***	*-0.059*		-0.059 ***
Probability that the lower bound of the YCC range is exceeded	0.009	*0.025*		0.025 **
Constant	0.512 ***	*0.495*	0.476 ***	0.019
Adjusted R-squared	0.938	—	0.833	0.813
Estimation period	January 1997 to March 2024			

2. Sources of Changes in Long-Term Interest Rates



Sources: Bank of Japan; Ministry of Internal Affairs and Communications; Bloomberg; LSEG Eikon.
Notes: 1. ***, **, and * in the table denote statistical significance at the 1, 5, and 10 percent levels, respectively. See Nakazawa and Osada (2024) for details of the estimation.
2. Figures in the chart are calculated based on the averages of the coefficients obtained in models (1) and (2) in the table.

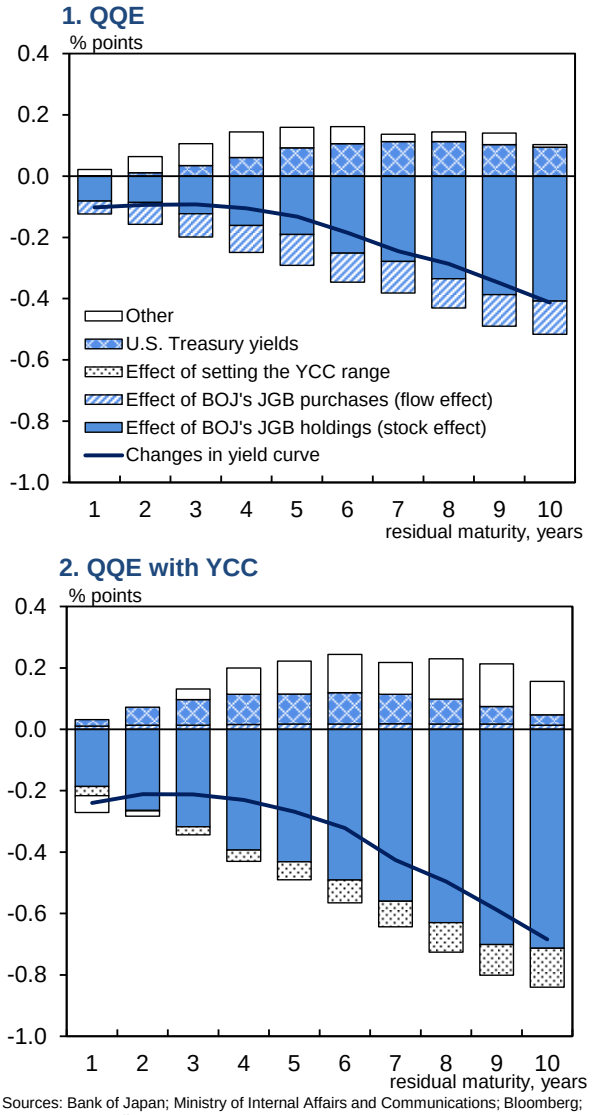
yield, the uncollateralized overnight call rate, and the year-on-year change in the CPI (excluding fresh food and energy, and the effects of consumption tax hikes).

[94] The *Assessment for Further Effective and Sustainable Monetary Easing* in March 2021 also examined the effect of the Bank's JGB purchases, suggesting that, with a somewhat different model from Nakazawa and Osada (2024), the JGB purchases had a statistically significant effect on long-term interest rates, pushing the rates down by about one percentage point on average.

Publication in the Broad-Perspective Review Series

Nakazawa, Takashi and Mitsuhiro Osada (2024), "The Bank of Japan's Large-Scale Government Bond Purchases and the Formation of Long-Term Interest Rates," Bank of Japan Working Paper Series, No.24-E-10.

Chart A8-2: Sources of Changes in the Yield Curve



Sources: Bank of Japan; Ministry of Internal Affairs and Communications; Bloomberg; LSEG Eikon.

Note: As for QQE, figures are the average from April 2013 to August 2016 relative to the average from January 2012 to March 2013. As for QQE with YCC, figures are the average from September 2016 to March 2024 relative to the average from January 2012 to March 2013. For details, see Nakazawa and Osada (2024).

Appendix 9: Impact of the Negative Interest Rate Policy on Interest Rate Formation

A negative interest rate policy is a measure that lowers short-term interest rates, which serve as the starting point of the yield curve, into negative territory by applying a negative rate to a portion of current account balances held by financial institutions at a central bank. This appendix examines the effects of the introduction of the Negative Interest Rate Policy on the formation of interest rates across various maturities.

Transmission Mechanism to Interest Rates

It seems that the application of a negative interest rate to central bank reserves not only lowered short-term interest rates but also altered expectations for future short-term rates, which, in turn, contributed to a decline in long-term interest rates (Chart 1-3-11). Previous studies, both theoretical and empirical, have shown that the implementation of a negative interest rate policy leads to a decline in the assumed lower bound of interest rates among market participants, thus extending the policy's impact to long-term rates.[95] These studies also suggest that a negative interest rate policy reduces the incentive for financial institutions to hold balances in central bank reserves, encouraging a shift in demand toward assets offering positive yields (i.e., a "search for positive yield"). This shift, particularly for long-term and super-long-term government bonds, pushes their yields down further. Although interest rate reductions generally tend to promote a demand shift towards higher-yielding assets, the introduction of a negative interest rate exerts a particularly strong influence on interest rate formation, as some investors seek to avoid holding

Chart 1-3-11: Transmission Channels of the Negative Interest Rate Policy

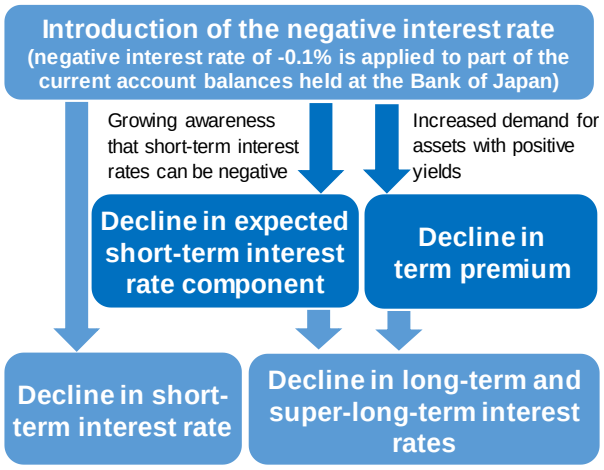
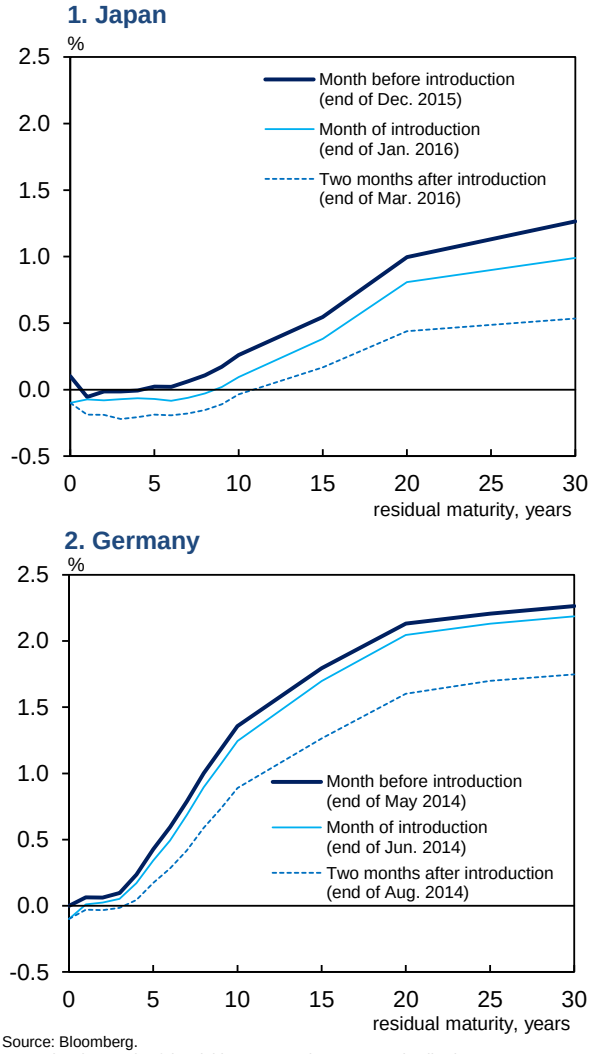


Chart 1-3-10: Changes in the Yield Curve before and after Introduction of a Negative Interest Rate Policy



Source: Bloomberg.
Note: The short ends of the yield curves are the announced policy interest rates.

[95] See Grisse, Krogstrup, and Schumacher (2017), for example.

assets with negative yields.[96]

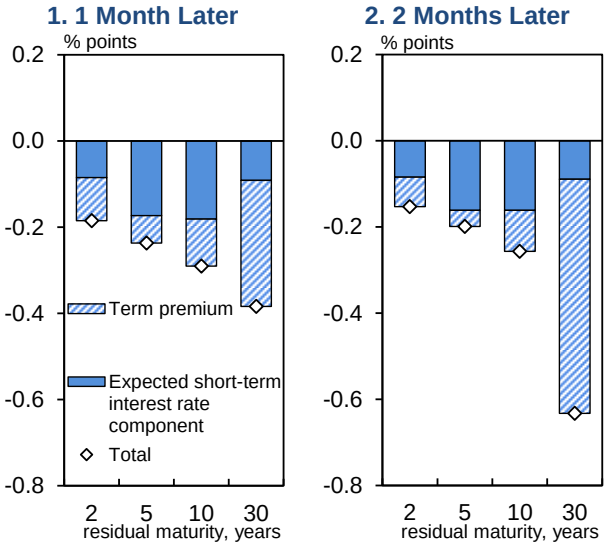
Moreover, it has been suggested that the combination of a negative interest rate policy with forward guidance and large-scale government bond purchases has a significant impact on interest rate formation. Previous studies have highlighted that the combination with forward guidance strengthens the effect of interest rate declines through changes in expectations for future short-term rates.[97] Additionally, the combination of a negative interest rate policy with large-scale government bond purchases has been reported to intensify the search for yield behavior, thereby creating a synergistic effect that results in a further reduction of long-term interest rates.

The Impact on Government Bond Yields

In Japan and the euro area, where negative interest rate policies had been introduced, declines were observed not only in short-term rates but also in long-term and super-long-term rates at the time of policy introduction. A review of the yield curve's movement when negative interest rates were introduced reveals that the starting point of the yield curve shifted downward, with notable declines seen in the long-term and super-long-term zones, albeit with some lag (Chart 1-3-10).

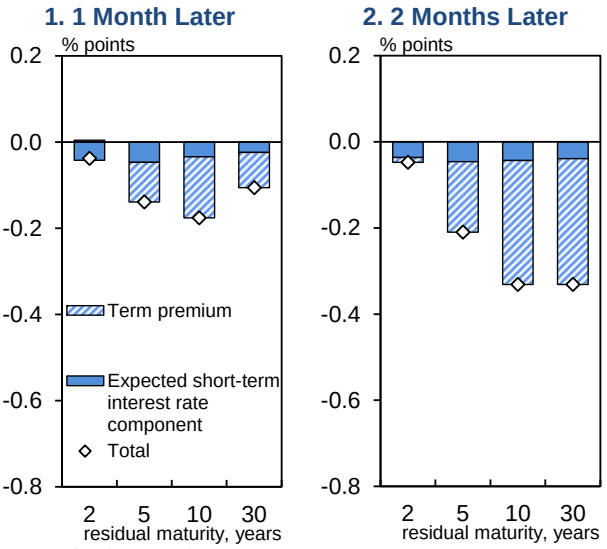
Using a term structure model of interest rate, the yield curves of Japan and the euro area are decomposed into two components: the "expected short-term interest rate" component, calculated as the average forecast for future short-term rates, and the "term premium" component. Changes in these components before and after the introduction of negative interest rates are

Chart A9-1: Changes in the Yield Curves (Japan)



Sources: Bloomberg; LJKmfa.
Notes: 1. Figures show the changes from the day before the announcement of the introduction of negative interest rate policy.
2. Figures for the expected short-term interest rate component are estimated by Krippner (2022).

Chart A9-2: Changes in the Yield Curves (Germany)



Sources: Bloomberg; LJKmfa.
Notes: 1. Figures show the changes from the day before the announcement of the introduction of negative interest rate policy.
2. Figures for the expected short-term interest rate component are estimated by Krippner (2022).

[96] See Lane (2019).

[97] See Rostagno et al. (2019).

compared (Charts A9-1 and A9-2).[98]

The analysis results show that a downward shift in the expected short-term interest rate component was observed across a broad range of maturities immediately after the policy introduction. Additionally, within two months of the introduction of negative interest rates, a significant decline in the term premium was evident in the long-term and super-long-term zones. This suggests that the introduction of the Negative Interest Rate Policy not only (1) lowered the expected short-term interest rate component, but also (2) reduced the term premium through yield-seeking behavior by investors, thereby contributing to the decline in long-term and super-long-term interest rates.

The analysis in Chart A9-3, which employs data from Japan and the euro area, estimates the impact of the Negative Interest Rate Policy on the term premium across various maturities. The estimation results suggest that the interest rate-lowering effect through the reduction of the term premium tends to be more pronounced for longer maturities. This implies a more significant shift in demand toward higher-yielding bonds, suggesting that the Negative Interest Rate Policy exerted downward pressure on the entire yield curve, leading to a flattening effect.

The Impact on Bank Lending Rates and Other Interest Rates

The decline in interest rates across a wide range of maturities following the introduction of the Negative Interest Rate Policy lowered bank lending rates and corporate bond yields, thereby likely facilitating an expansion in positive investment by firms and households. Previous research has reported that the introduction of

Chart A9-3: Effects of Negative Interest Rate Policies on Term Premiums

1. Model Specification

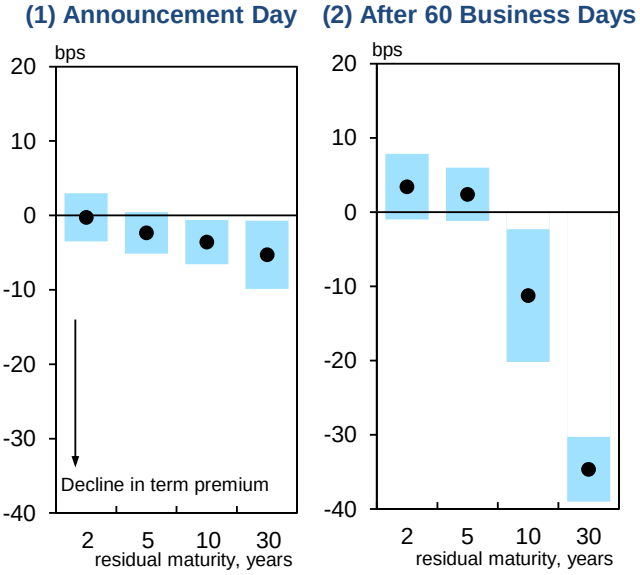
$$\Delta TP^{M}_{t,t+h,i} = \beta_h * \Delta r_{t,i} + Control\ Variables + \epsilon_{t,t+h,i}$$

$\Delta TP^{M}_{t,t+h,i}$: Change in M-year term premiums over the period from t-1 to t+h
$\Delta r_{t,i}$: Negative interest rate policy shock

Country: Japan, Germany, France, Italy, and Spain
Period: January 1, 2014 to December 31, 2018

Note: Control variables are negative interest rate policy shocks in periods from t+1 to t+h, the other monetary policy shocks in periods from t to t+h, country fixed effects, and time fixed effects.

2. Estimation Results



Sources: Altavilla et al. (2019); Bloomberg; Grisse, Krogstrup, and Schumacher (2017); Kubota and Shintani (2022); LJKmfa.
Note: The points represent the cumulative impulse responses to a -10 bps negative interest rate policy shock. The shaded areas indicate the 90 percentile bands. For details, see Haba, Ito, and Kasai (2024).

[98] For details of the estimation methods and results, see Haba, Ito, and Kasai (2024).

negative interest rates in the euro area resulted in a clear reduction in bank lending rates.[99]

Such developments have also been observed in Japan, where the decline in government bond yields following the introduction of the Negative Interest Rate Policy led to a reduction in bank lending rates, corporate bond yields, and commercial paper rates (Chart A9-4).[100] A comparison of the decline in these rates with the reduction in policy rates shows that they have generally been in line with average levels observed in phases of past interest rate cuts. However, there is also a view that the introduction of negative interest rates could worsen the profitability of financial institutions, thereby weakening the transmission effect on bank lending rates. Some studies covering Europe have reported that the transmission effect of policy rates on bank lending rates diminished after the introduction of negative interest rates.[101]

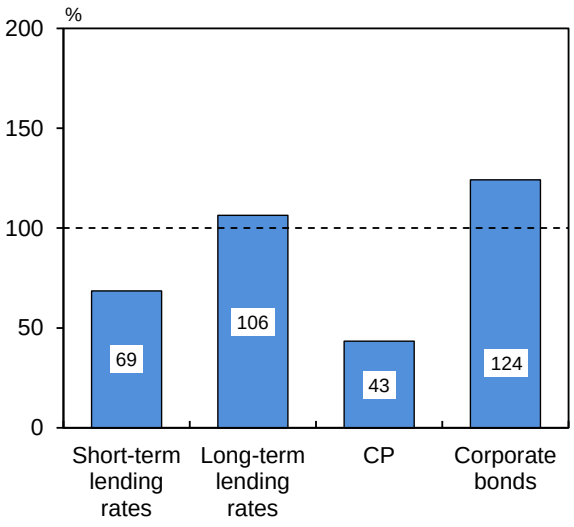
The extent to which policy rate reductions influence bank lending rates partly depends on the management strategies of financial institutions. It is important to bear in mind that the impact on interest rate formation may vary depending on the prevailing economic and financial conditions, including the profitability of financial institutions.

Publication in the Broad-Perspective Review Series

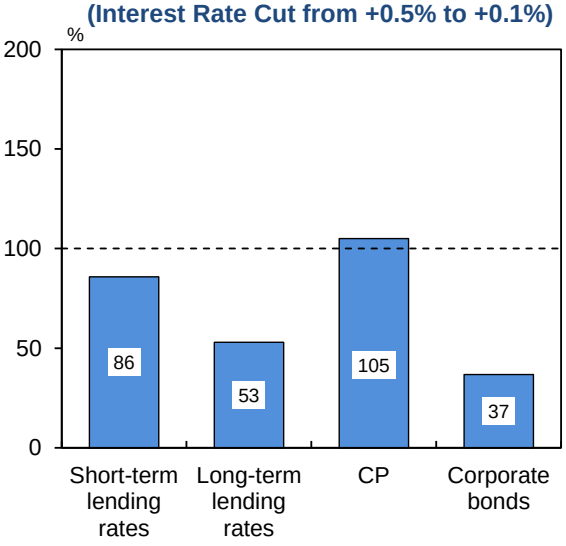
Haba, Shunsuke, Yuichiro Ito, and Yoshiyasu Kasai (2024), "The Impact of Negative Interest Rate Policy on Interest Rate Formation and Lending," mimeo.

Chart A9-4: The Pass-Through Rate of Interest Rates in Each Phase

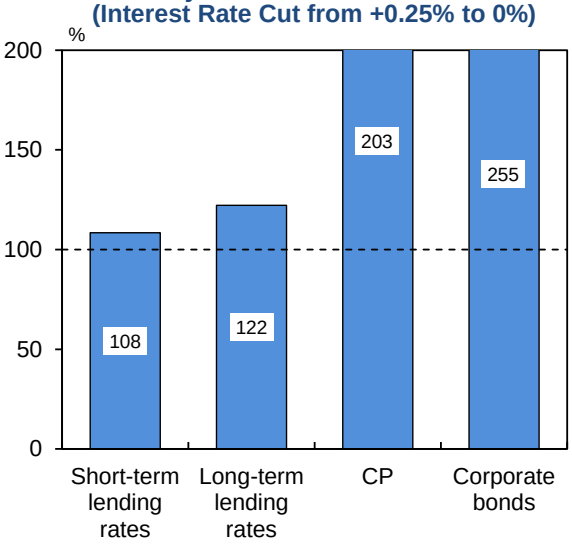
1. January 2016
(Interest Rate Cut from +0.1% to -0.1%)



2. October-December 2008
(Interest Rate Cut from +0.5% to +0.1%)



3. February-March 2001
(Interest Rate Cut from +0.25% to 0%)



Sources: Bank of Japan; Japan Securities Depository Center; Capital Eye; I-N Information Systems; Bloomberg.
Notes: 1. The pass-through rate is the ratio of the rate of change in each interest rate to that in the policy interest rate (or the IOER). The rate of change in each interest rate is calculated as the difference between the average of each interest rate 4-6 months after the policy change and that 3 months before the policy change.
2. Figures for lending rates are the average contract interest rates on new loans and discounts. Figures for CP are issuance yields for 3-month CP rated a-1 in 1. and a-1 or higher in 2. and 3. Figures for corporate bonds are the average issuance yields of bonds rated AA.

[99] See Eisenschmidt and Smets (2019).
[100] See Bank of Japan (2016).
[101] See Adolfsen and Spange (2020).

Appendix 10: Large-Scale Monetary Easing and Economic Activity and Prices: Counterfactual Simulations

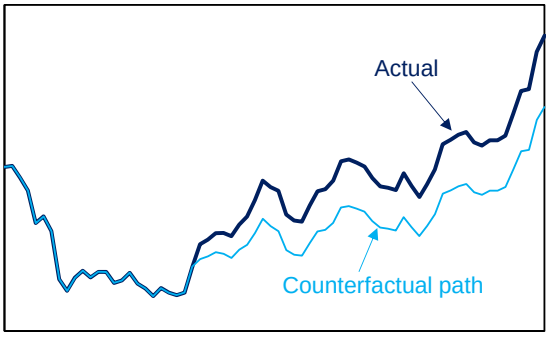
This appendix presents the quantitative analysis of the effects on economic activity and prices of the large-scale monetary easing after 2013, using macroeconomic models.

The analytical framework is as follows. First, the "counterfactual paths" for major financial and economic variables in the absence of the large-scale monetary easing are constructed (Chart A10-1(1)). Then, counterfactual simulations are conducted for economic activity and prices in the case where financial and economic variables followed the aforementioned counterfactual paths, using macroeconomic models (Chart A10-1(2)). Finally, the policy effects are calculated as the differences between the actual values and the simulated counterfactual values.

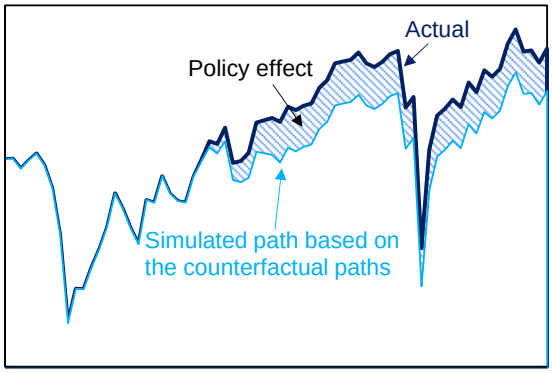
Given model uncertainty, two different types of models are used in the analysis: (1) the Bank's large-scale macroeconomic model (Q-JEM) [102] and (2) a large-scale time series model (Factor-Augmented Vector Autoregressive (FAVAR) model) newly constructed for this analysis. The simulated values are compared in each of the two different types of models. The following sections provide, by model, an overview of the simulations and present an explanation of their results.

Chart A10-1: Estimation of Policy Effects

1. Setting Counterfactual Paths (for Exchange Rates, Stock Prices, etc.)



2. Simulation to Estimate Effects on GDP and CPI



Simulations with Q-JEM

Simulation Framework

Q-JEM is a semi-structural model that takes economic theories into account and is able to analyze policy effects while identifying their

[102] Q-JEM (Quarterly Japanese Economic Model) is a large-scale macroeconomic model with more than 200 variables that are important for analyzing the Japanese economy, including real, financial, and expectations variables. Each equation is estimated using historical data for Japan. For details, see Hirakata et al. (2019).

transmission channels.

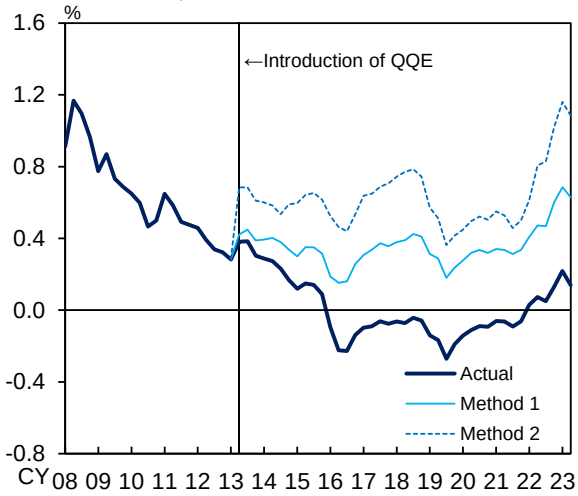
This section analyzes the effects on economic activity and prices of the large-scale monetary easing after 2013, through the channels starting from the following five financial and economic variables: (1) nominal interest rates, (2) medium- to long-term inflation expectations, (3) DI for financial institutions' lending attitudes, (4) foreign exchange rates, and (5) stock prices.[103] Two-pattern counterfactual paths are constructed for each variable in the absence of the large-scale monetary easing, using the methods below. Counterfactual simulations are then conducted, using Q-JEM. In the simulations, the combinations of the two-pattern counterfactual paths for each variable are used.

(1) Nominal Interest Rates (by maturity, 1-10 years)

The counterfactual paths for nominal interest rates are constructed by extracting the policy effects based on regression analysis (Charts A10-2 and A10-3).

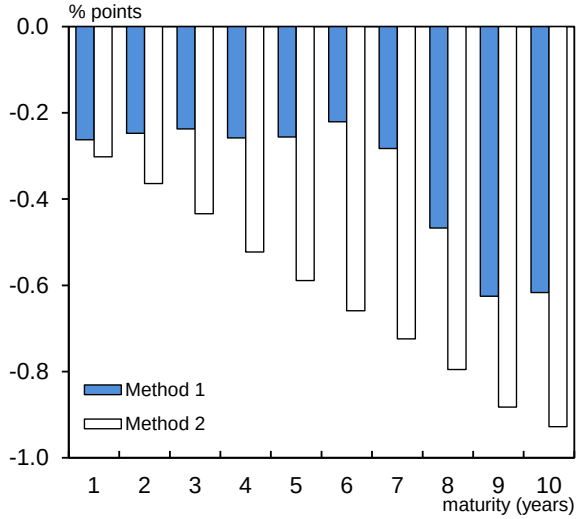
First, the interest rate equations are estimated where the dependent variable is the nominal interest rate and the explanatory variable includes policy proxies such as the share of the Bank's JGB holdings. Then, the predicted values of the equations in the case where policy proxies remained at the same level as just before the introduction of the large-scale monetary easing are considered as the counterfactual paths. To account for model uncertainty, the following two paths are estimated as counterfactuals. One is estimated using the equation where the policy proxy is the actual share of the Bank's JGB holdings (Method 1). The other is estimated using

Chart A10-2: Counterfactual Paths for Nominal Interest Rates (Average of 1 to 10 Year Rates)



Source: Ministry of Finance.
Note: See Chart A10-8 for details of Methods 1 and 2 (the same applies to the following charts).

Chart A10-3: Average Policy Effect on Nominal Interest Rates by Maturity



Note: The figure shows the difference between the actual nominal interest rates and counterfactual ones obtained by Methods 1 and 2 after the introduction of QQE (average for 2013/Q2-2023/Q2).

[103] For details of the methods of the analysis and its results, see Haba et al. (2024b).

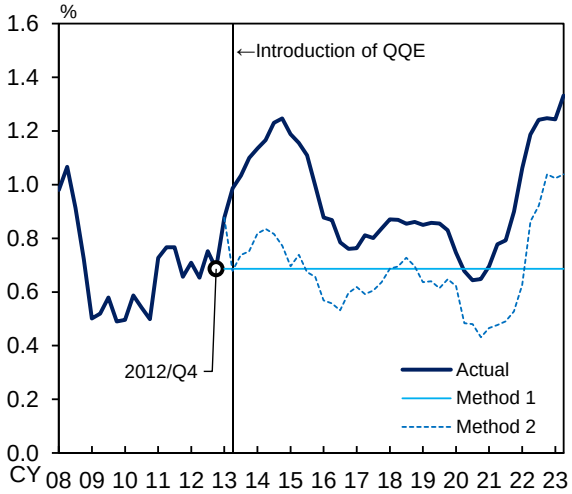
the equation where the policy proxies are variables such as the expected share of the Bank's JGB holdings and the probability of exceeding the upper limit of the fluctuation range under yield curve control (Method 2). [104]

(2) Medium- to Long-Term Inflation Expectations

The counterfactual paths for medium- to long-term inflation expectations are constructed using the following two methods (Chart A10-4).

In the first method, a counterfactual path is constructed by assuming that medium- to long-term inflation expectations would have remained at the level of the October-December quarter of 2012 in the absence of the large-scale monetary policy (Method 1). In the second method, a counterfactual path is estimated by identifying the overall policy effects on medium- to long-term inflation expectations, divided into the "direct effects" on the one hand, and the "indirect effects" resulting from the improvement in the output gap through a reduction in nominal interest rates on the other (Method 2). The direct effects are calculated as the residuals of the estimated equation (the parts which cannot be accounted for by the following explanatory variables), where the dependent variable is medium- to long-term inflation expectations and the explanatory variables are the trend component of inflation and international commodity prices - an exogenous factor. [105,106] The indirect effects are calculated as the differences between the actual values and the counterfactual values which are estimated by

Chart A10-4: Counterfactual Paths for Medium- to Long-Term Inflation Expectations



Sources: Bloomberg; Consensus Economics Inc., "Consensus Forecasts"; QUICK, "QUICK Monthly Market Survey <Bonds>"; Bank of Japan.

[104] For details of Method 2, see Nakazawa and Osada (2024).

[105] The GSCI Commodity Index (the deviation from its trend) is used as the proxy of international commodity prices. For details of how to calculate the trend component of inflation and the deviation of international commodity prices from their trend, see Haba et al. (2024b).

[106] "Direct effects" include additional effects on inflation expectations through the real interest rate channel. For details, see Haba et al. (2024b).

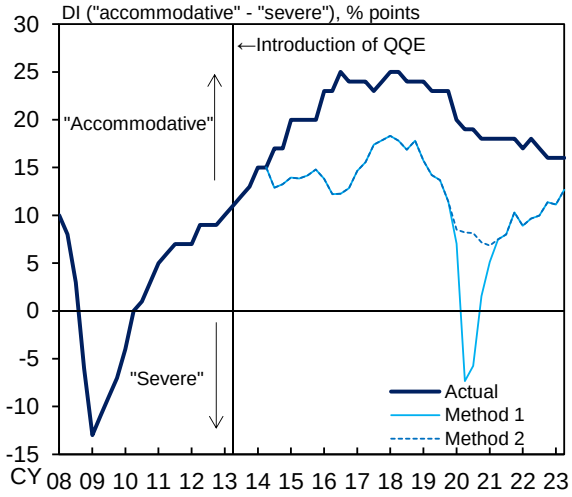
extrapolating the counterfactual path in the absence of the large-scale monetary easing of nominal interest rates (estimated by (1)-Method 2) into Q-JEM.

(3) DI for Financial Institutions' Lending Attitudes

The counterfactual paths for the DI for financial institutions' lending attitudes are estimated by separately identifying the direct effects and the indirect effects of the stimulus through a decline in real interest rates (Chart A10-5).

The direct effects are calculated as the residuals of the estimated equation (the parts which cannot be accounted for by the following explanatory variable) for lending attitudes where the dependent variable is the DI in the *Tankan* for financial institutions' lending attitudes and the explanatory variable is the DI in the *Tankan* for business conditions.[107] The indirect effects are calculated as the difference between the actual values and the counterfactual values of the DI for financial institutions' lending attitudes in the absence of the large-scale monetary easing. The counterfactual values are estimated by extrapolating the above counterfactual paths of nominal interest rates (estimated by (1)-Method 2) and medium- to long-term inflation expectations (estimated by (2)-Method 2) into Q-JEM. The overall policy effects are calculated using the following two methods. In the first method, the overall effects are calculated as the sum of the direct effects and the indirect effects (Method 1). In the second method, to take into account the possibility that the direct effects include the effects of factors such as the government's financial support to firms during the COVID-19 pandemic, the values of the direct effects after the January-

Chart A10-5: Counterfactual Paths for Lending Attitudes DI



Source: Bank of Japan.

[107] The lending attitude equation is estimated using the dataset until the January-March quarter of 2013, which is just before the introduction of the large-scale monetary easing.

March quarter of 2020 are calculated with the level of the October-December quarter of 2019 as the upper limit, and then the overall effects are calculated as the sum of the direct effects and the indirect effects (Method 2).

(4) Foreign Exchange Rates (U.S. dollar/yen rate)

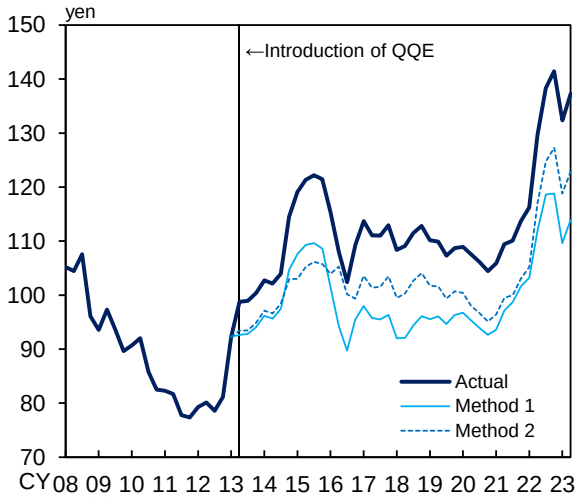
The counterfactual paths for foreign exchange rates (U.S. dollar/yen rate) are constructed using the following two methods (Chart A10-6).

In the first method, a counterfactual path is constructed by extrapolating the aforementioned counterfactual path of nominal interest rates (estimated by (1)-Method 2) into the estimated equation where the dependent variable is U.S. dollar/yen rates, and the explanatory variables are the differences between Japan and the United States in long-term interest rates and inflation rates (Method 1). In the second method, a counterfactual path is constructed by identifying the policy effects, focusing on five monetary policy changes after April 2013.[108] First, the changes in the U.S. dollar/yen rate from the previous business day to the end of the following quarter for each event are considered to be the shocks incurred by the large-scale monetary easing. Then, the values of the U.S. dollar/yen rate in the absence of the policy shocks are estimated using Q-JEM, and treated as a counterfactual path in the analysis (Method 2: Event Study Approach).

(5) Stock Prices

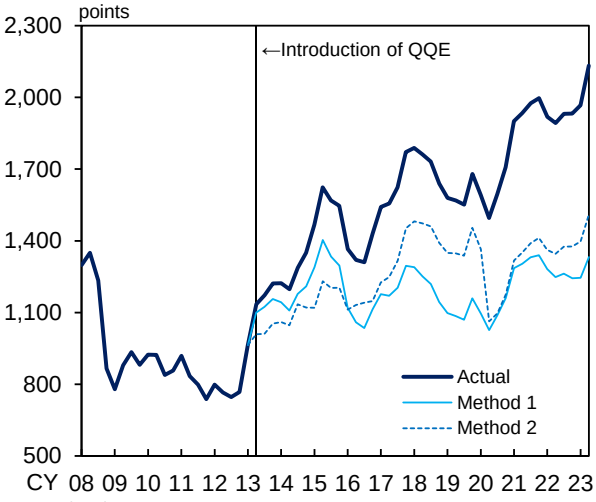
The counterfactual paths for stock prices are constructed using the following two methods

Chart A10-6: Counterfactual Paths for U.S. Dollar/Yen Rate



Source: Bank of Japan.

Chart A10-7: Counterfactual Paths for Stock Prices (TOPIX)



Source: Bloomberg.

Chart A10-8: How to Create Counterfactual Paths in Q-JEM Simulations

	Method 1	Method 2
(1) Nominal Interest Rates	Estimation using actual BOJ's government bond holding ratio etc. as policy variables	Estimation using BOJ's government bond holding ratio forecast etc. as policy variables
(2) Medium- to Long-Term Inflation Expectations	Constant from the level just before the introduction of "the price stability target" of 2%	Estimation of both the direct effects on inflation expectations and indirect effects through economic stimulation due to lower nominal interest rates
(3) Lending Attitudes DI	Estimation of both the direct effects on lending attitudes DI and indirect effects through economic stimulation due to lower real interest rates	Same as left (excluding the effects of government funding support measures etc. during the COVID-19 pandemic)
(4) U.S. Dollar/Yen Rate (5) Stock Prices (TOPIX)	Estimation of the effects of lower real interest rates and the improvement of loan availability in lending market	Changes in the exchange rate and stock prices around the time of monetary policy events are measured as policy shocks (event study approach)

[108] The five changes are as follows: (1) the introduction of Quantitative and Qualitative Monetary Easing (QQE) (April 2013), (2) the expansion of QQE (October 2014), (3) the introduction of the Negative Interest Rate Policy (January 2016), (4) the introduction of Yield Curve Control (September 2016), and (5) the Enhancement of Monetary Easing in Light of the Impact of the Outbreak of COVID-19 (March 2020).

(Chart A10-7).

In the first method, a counterfactual path is constructed for stock prices in the absence of the large-scale monetary easing, obtained by extrapolating the above counterfactual paths of nominal interest rates (estimated by (1)-Method 2), medium- to long-term inflation expectations (estimated by (2)-Method 2), DI for financial institutions' lending attitudes (estimated by (3)-Method 1), and foreign exchange rates (estimated by (4)-Method 1) into Q-JEM (Method 1). In the second method, a counterfactual path is constructed using the same approach as for foreign exchange rates. The values of stock prices in the absence of monetary easing are estimated using Q-JEM, following the extraction of policy shocks in the five monetary policy changes after April 2013. The estimated stock prices are then considered to be a counterfactual path (Method 2: Event Study Approach).

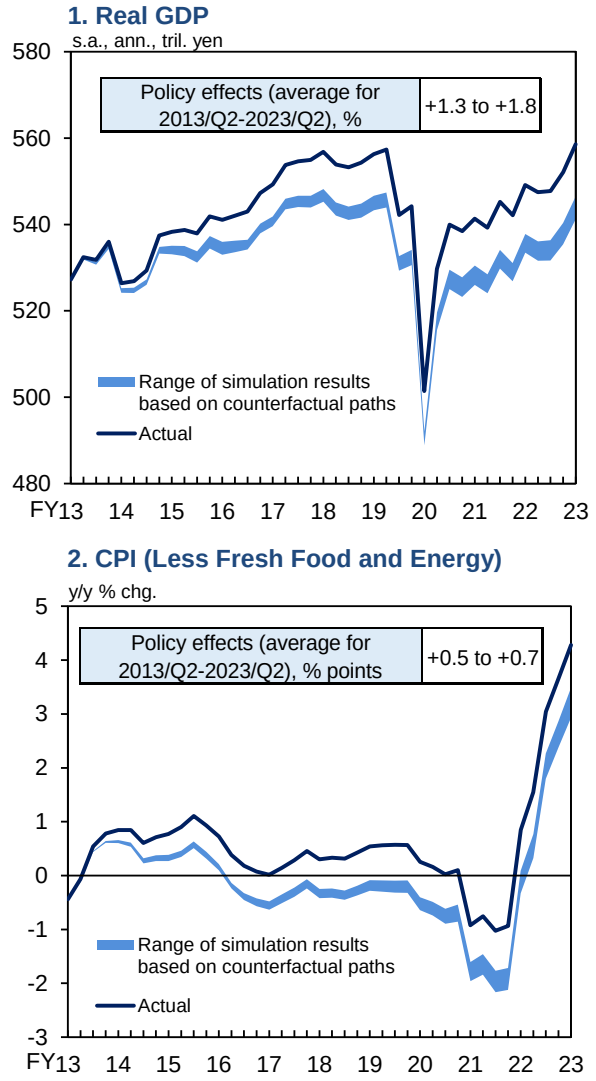
Subsequently, in the analysis, a total of 16 counterfactual scenarios are constructed by combining the counterfactual paths for each variable.[109] Counterfactual simulations are then conducted by extrapolating those scenarios into Q-JEM (Chart A10-8).

Simulation Results

Looking at the simulation results, the simulated values of real GDP and the year-on-year rate of change in consumer prices (less fresh food and energy) are lower than the actual values of those in all scenarios (Chart 1-3-12). This suggests that the large-scale monetary easing had a pushing-up effect on economic activity and prices.

These results are consistent with the analysis

Chart 1-3-12: Assessments of Policy Effects Using the Q-JEM



Sources: Ministry of Internal Affairs and Communications; Cabinet Office; Haba et al. (2024b).
Notes: 1. The CPI figures are staff estimates and exclude the effects of consumption tax hikes, policies concerning the provision of free education, and travel subsidy programs.
2. The range of the simulation results shows the maximum to minimum values at each time point across 16 simulation results.

[109] For foreign exchange rates and stock prices, only the combinations of counterfactual paths calculated using the same methods are used. As a result, the total number of counterfactual scenarios is 16 (=2^4).

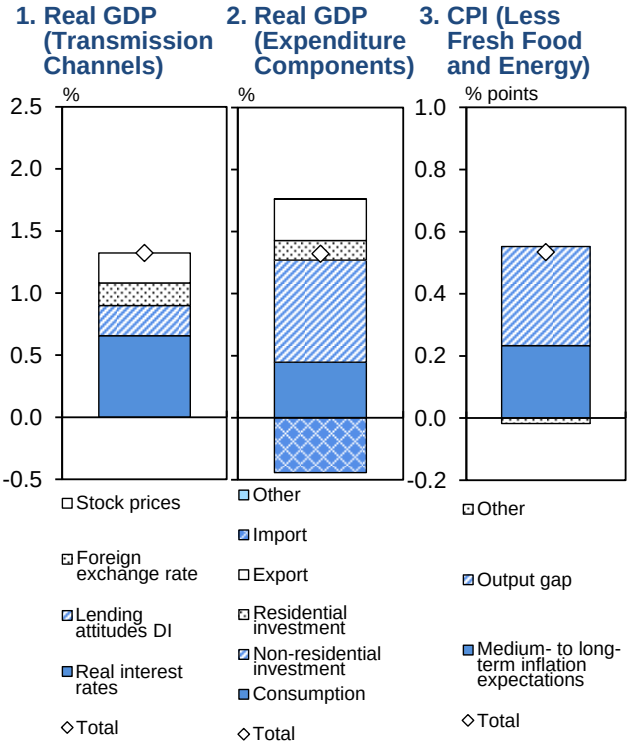
conducted in the *Assessment for Further Effective and Sustainable Monetary Easing* (hereafter the "Assessment") in March 2021.[110]

Looking at the degree of the policy effects during the period from the introduction of large-scale monetary easing in the second quarter of 2013, to the second quarter of 2023, the simulation results indicate that the level of real GDP was pushed up by around 1.3 to 1.8 percent on average over the period (1.6 percent on average across the scenarios), and the year-on-year rate of change in consumer prices (less fresh food and energy) was pushed up by around 0.5 to 0.7 percentage point over the period (0.6 percentage points on average across the scenarios).

The decomposition of the pushing-up effects on real GDP by transmission channel suggests that the various channels have contributed. The decomposition of the pushing-up effects on real GDP by expenditure component suggests that the contributions of business fixed investment and private consumption have been larger (Chart 1-3-13). The decomposition of the pushing-up effects on prices suggests that the output gap and medium- to long-term inflation expectations have contributed to a similar extent.

As presented above, the results of the analysis using Q-JEM suggest that the policy effects through lower real interest rates, favorable conditions in financial and capital markets, and accommodative lending attitudes pushed up economic activity and prices.

Chart 1-3-13: Decomposition of the Simulation Results



Source: Haba et al. (2024b).
Notes: 1. The CPI figures are staff estimates and exclude the effects of consumption tax hikes, policies concerning the provision of free education, and travel subsidy programs.
2. The figures show the average policy effects for 2013/Q2-2019/Q4. The real GDP figures show the deviation from the actual level, and the CPI figures the deviation from the actual inflation rate. The charts show the results of the simulations that produced the largest policy effects out of the 16 simulations.

Simulations with FAVAR Model

Simulation Framework

Vector autoregressive (VAR) models – a method of time-series analysis – do not explicitly assume

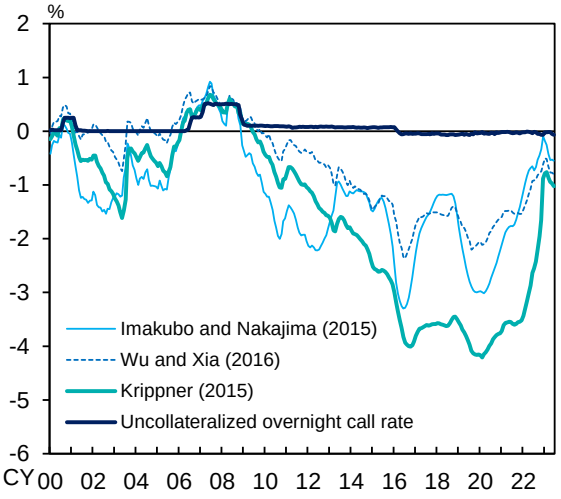
[110] For details, see Kawamoto et al. (2021).

structural relationships among variables, which results in a feature of VAR models wherein they have fewer estimation conditions than other structural models, and thus they are more likely to achieve results that are better aligned with the actual data. Factor-augmented VAR (FAVAR) models have another feature that allows them to handle a large number of variables in one model, in addition to the feature of VAR models mentioned above. Taking these features into account, this section estimates a FAVAR model which consists of more than 200 financial and economic variables, including consumer prices, and then examines the impact of the large-scale monetary easing on economic activity and prices based on a model different from Q-JEM. [111]

One important issue in the simulations is which variables should be used as policy proxies in the FAVAR model. Given that the large-scale monetary easing had been supposed to affect economic activity and prices mainly through a reduction in long-term interest rates, the simulations are conducted by firstly estimating "shadow rates," which aggregates the information of the entire yield curve, and using these as the policy proxies. Specifically, shadow rates are estimated using three different term-structure models of interest rates, and then three different types of FAVAR model are estimated using these rates (Chart A10-9).[112]

The counterfactual paths for shadow rates, which are the policy proxies in the simulations, are then constructed in the absence of the large-scale monetary easing. Specifically, the counterfactual

Chart A10-9: Shadow Rates



Sources: Bank of Japan; Bloomberg; Consensus Economics Inc., "Consensus Forecasts."

[111] For details of the analysis methods and results, see Hirata et al. (2024).

[112] In this analysis, the following three models are used: (1) the Imakubo and Nakajima (2015) model, which takes into account features of the yield curve in Japan, as well as (2) Wu and Xia (2016), and (3) Krippner (2015), both of which were developed to analyze yield curves in countries such as the United States.

paths are constructed by assuming that the negative values of shadow rates would have resulted from the large-scale monetary easing and then setting those values to zero. Then, counterfactual developments in economic activity and prices in the absence of policy shocks are estimated by extrapolating the counterfactual shadow rate paths into the FAVAR model. Finally, the actual values and the simulated values are compared in the analysis.

Simulation Results

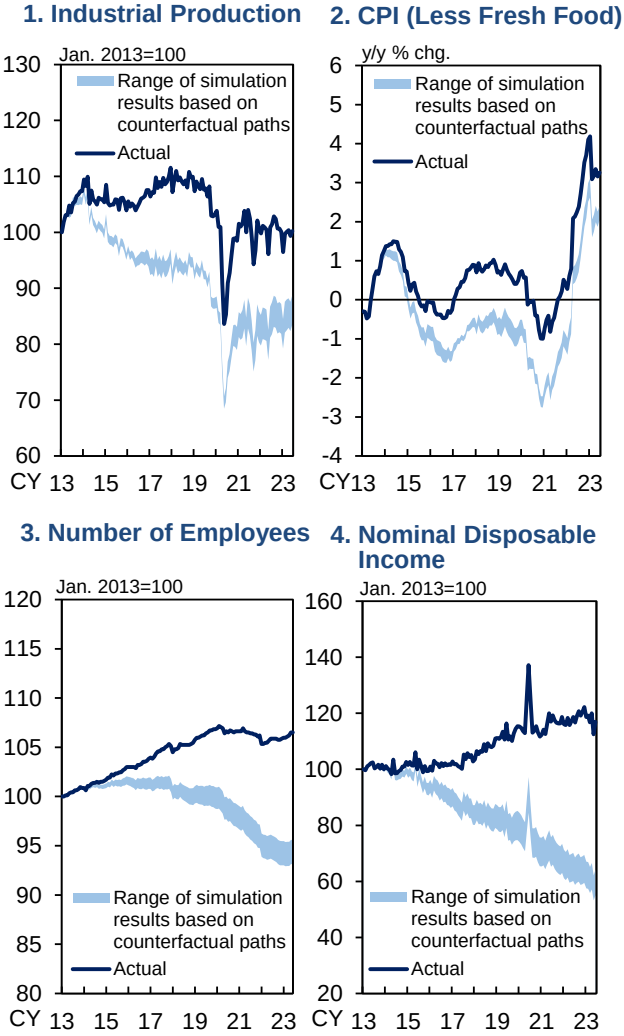
Simulation results suggest that the series of monetary easing policies after 2013 had a pushing-up effect on economic activities such as industrial production, employment, and income situation (Chart 1-3-14).

Moreover, the simulated counterfactual values of the year-on-year rate of change in consumer prices (less fresh food) in the absence of the large-scale monetary easing, are lower than the actual values in all shadow rate cases. Looking at the degree of the policy effects during the period from the introduction of the large-scale monetary easing in April 2013 to June 2023, the simulation results indicate that the year-on-year rate of change in consumer prices (less fresh food) was pushed up by around 0.6 to 1.1 percentage points over the period (0.9 percentage points on average across the above three patterns). These results are broadly in line with the results in the Assessment conducted in 2021, and in the above Q-JEM simulations.

Conclusion

This appendix presents the quantitative analysis of the effects on economic activity and prices of the large-scale monetary easing after 2013. Although the results differ somewhat depending on how the counterfactual paths of financial and economic

Chart 1-3-14: Assessments of Policy Effects Using the Time-Series (FAVAR) Model



Sources: Bloomberg; Consensus Economics Inc., "Consensus Forecasts"; Ministry of Economy, Trade and Industry; Ministry of Health, Labour and Welfare; Ministry of Internal Affairs and Communications.
Note: The CPI figures are staff estimates and exclude the effects of consumption tax hikes.

variables in the absence of the large-scale monetary easing are constructed, the two results above suggest that the large-scale monetary easing has had some positive effects on economic activity and prices. Moreover, considering that the simulation results obtained from the two models with different characteristics are broadly consistent with each other, it suggests that the above assessment of the large-scale monetary easing is robust to some extent.

Publications in the Broad-Perspective Review Series

Haba, Shunsuke, Kimihiko Izawa, Yui Kishaba, Yusuke Takahashi, and Shunichi Yoneyama (2024b), "Measuring Policy Effects since the Introduction of Quantitative and Qualitative Monetary Easing (QQE): An Analysis Using the Macroeconomic Model Q-JEM," mimeo.

Hirata, Atsuki, Sohei Kaihatsu, Yoshiyasu Kasai, Hiroki Yamamoto, and Jouchi Nakajima (2024), "Effects and Side Effects of Unconventional Monetary Policy: A Shadow Rate Approach," Bank of Japan Working Paper Series, No.24-E-21.

Nakazawa, Takashi and Mitsuhiro Osada (2024), "The Bank of Japan's Large-Scale Government Bond Purchases and the Formation of Long-Term Interest Rates," Bank of Japan Working Paper Series, No.24-E-10.

Appendix 11: Large-Scale Monetary Easing and the Functioning of Bond Markets

As described in Appendix 10, Quantitative and Qualitative Monetary Easing (QQE) and the Yield Curve Control (YCC), which was one form of large-scale purchases of JGBs, had a pushing-up effect on economic activity and prices through factors such as a decline in real interest rates. On the other hand, it has been pointed out that the degree of functioning of the JGB market declined as the Bank increased its holdings of JGBs under such large-scale monetary easing. It has also been pointed out that the decline in the functioning of the JGB market has affected the functioning of related markets, such as the corporate bond market.

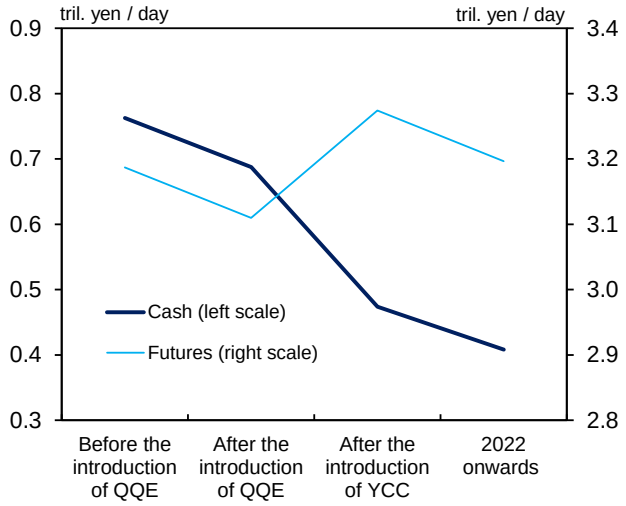
This appendix presents the results of analyses of the effects of large-scale monetary easing on the functioning of the JGB and corporate bond markets.

Impact on the Functioning of the JGB Market

Many metrics exist for measuring market functioning, but here liquidity indicators (specifically, transaction volume and bid-ask spread) [113] and relative price indicators (yield curve distortion) are adopted as market functioning metrics (Charts 1-4-5, 1-4-6, and 1-4-7). Based on this, regression analyses are conducted using them as the dependent variables with panel data for JGB issues (Chart A11-1).[114]

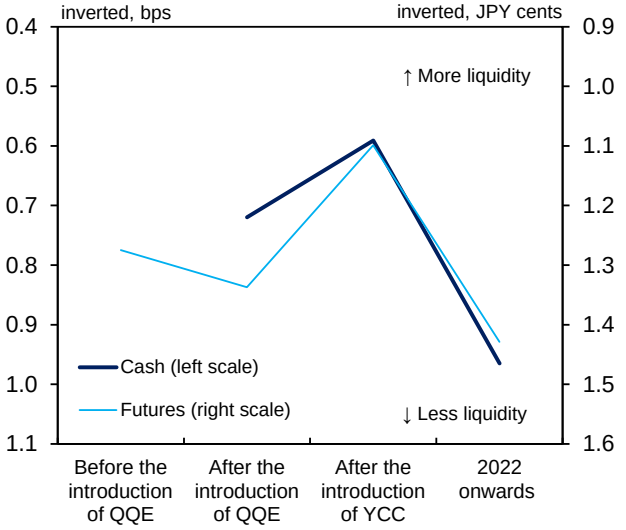
The Bank's purchase of JGBs is considered to have both an improvement effect (spotlight effect) and an adverse effect (scarcity effect) on market

Chart 1-4-5: JGB Transaction Volume



Sources: QUICK; Japan Bond Trading; Osaka Stock Exchange, Inc.
Notes: 1. Figures are period averages (before the introduction of QQE: January 2012 to March 2013; after the introduction of QQE: April 2013 to September 2016; after the introduction of YCC: October 2016 to December 2021; 2022 onwards: January 2022 to January 2024).
2. Figures for the transaction volume in the cash market are the total daily transaction volume (inter-dealer transactions) in 2-, 5-, 10-, 20-, 30-, and 40-year bonds.

Chart 1-4-6: Bid-Ask Spreads of JGBs



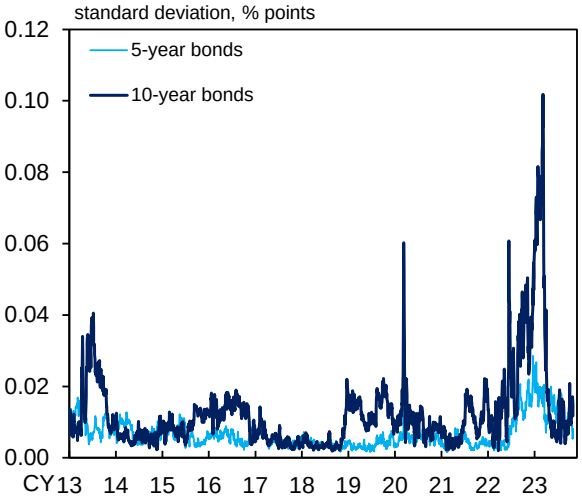
Sources: Japan Bond Trading; Nikkei Inc., "Nikkei NEEDS."
Notes: 1. Figures are period averages (before the introduction of QQE: January 2012 to March 2013; after the introduction of QQE: April 2013 to September 2016; after the introduction of YCC: October 2016 to December 2021; 2022 onwards: January 2022 to January 2024).
2. Figures for the cash market are the average of bid-ask spreads at a 1-second frequency for on-the-run 10-year bonds (inter-dealer transactions). Figures for the futures market are the average of the widest 10 percent of bid-ask spreads at a 1-minute frequency.

[113] For liquidity indicators of government bonds, see Nishizaki, Tsuchikawa, and Yagi (2013), and Kurosaki et al. (2015).

[114] For details of the analysis method and results, see Fukuma et al. (2024).

liquidity.[115] The spotlight effect occurs when the Bank purchases a certain JGB issue and it becomes easier for market participants to sell that issue, leading to an increase in inter-dealer transactions and an improvement in market liquidity. This effect can be captured by such variables as the share of JGB purchases by the Bank, that is, the amount of JGB purchases by the Bank (which is a flow variable) divided by the outstanding issuance amount. On the other hand, the scarcity effect occurs when the Bank's purchase of JGBs causes the volume of bonds circulating in the market to decline, leading to a reduction in transaction volume and deteriorated market liquidity. This effect can be captured by the share of JGBs held by the Bank, that is, the outstanding amount of JGBs held by the Bank (which is a stock variable) divided by the outstanding issuance amount.

Chart 1-4-7: Distortions in the JGB Yield Curve



Source: Japan Securities Dealers Association.
Note: The chart shows the standard deviation between the yield curve smoothed with a cubic spline and the actual market yield. "5-year bonds" refers to bonds with a remaining maturity of 3.5-5.5 years, while "10-year bonds" refers to bonds with a remaining maturity of 7-10.5 years.

[115] For the spotlight and scarcity effects, see Pelizzon et al. (2018), for example.

Among the Bank's market operations, the conduct of fixed-rate purchase operations and continuous fixed-rate purchase operations may also affect market functioning. Specifically, in addition to having a direct impact on the shape of the yield curve, it is also possible that trading may ease off due to the expectation that the continuous fixed-rate purchase operations will take place, the yield on that issue will hit the interest rate level for continuous fixed-rate purchase operations, and that the resulting price change will be restricted. These effects can be captured by the following dummy variables: One of them takes the value 1 when the yield on the issue subject to continuous fixed-rate purchase operations is within 3 basis points of the interest rate level for continuous fixed-rate purchase operations. Another takes the value 1 when the bid for (continuous) fixed-rate purchase operations has been submitted.

Chart A11-1: Framework of the Empirical Analyses Using Panel Data for JGB Issues

1. Liquidity Indicators (Transaction Volume, Bid-Ask Spread)

QQE (Large-Scale JGB Purchases)	
Spotlight effect	Scarcity effect
When a central bank purchases a certain bond issue, inter-dealer transactions for that issue increase.	When a central bank purchases bonds, the volume of bonds circulating in the market declines, which reduces transaction volume.
Share of BOJ purchases	Share of BOJ holdings

YCC (Yield Curve Control)
Fixed-rate purchase operations to accomplish the long-term interest rate target of YCC
Operations for limitless purchases of government bond of a certain maturity at a fixed interest rate in order to prevent large interest rate increases
YCC range of fluctuation upper bound dummy

2. Yield Curve Distortion (Deviation from the Spline of the Yield Curve for Each Individual Issue)

QQE
Decrease in the volume of JGBs circulating in the market by BOJ holding
When the volume of a certain JGB issue circulating in the market decreases, the balance of supply and demand for that issue is distorted.
Share of BOJ holdings

YCC
Fixed-rate purchase operations to accomplish the long-term interest rate target of YCC
Operations for limitless purchases of government bond of a certain maturity at a fixed interest rate in order to prevent large interest rate increases
Fixed-rate purchase operations dummy Continuous fixed-rate purchase operations dummy

Note: For spotlight and scarcity effects, see, for example, Pelizzon et al. (2018).

Panel Data Analysis of Government Bonds by Issue (1): Impact on Transaction Volume

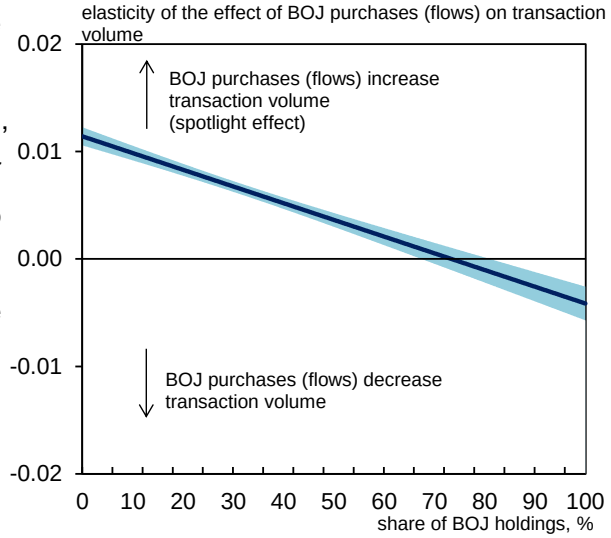
The results of the analysis where transaction volume is the dependent variable show that the Bank's purchase of JGBs increases transaction volume (spotlight effect), while an increase in the share of the JGBs held by the Bank decreases transaction volume (scarcity effect) (Chart A11-2(1)). In addition, continuous fixed-rate purchase operations reduce transaction volume. However, when large-scale JGB purchases are conducted for a prolonged period and the Bank's holdings of JGBs exceed a certain threshold (about 70 percent), an increase in the purchase amount of the Bank's JGB purchases tends to reduce transaction volume (Chart A11-2(2)). These results suggest that when the share of a certain JGB issue held by the Bank reaches a certain level, market participants will realize that inter-dealer market liquidity has decreased, there will be no incentive to trade outside of auctions conducted through the Bank's operations, and an adverse spotlight effect will occur.

Chart A11-2: Panel Data Analysis (Impact on JGB Transaction Volume)

1. Estimation Results

	Dependent variable: transaction volume
Share of BOJ purchases (%)	0.0114 ***
Share of BOJ holdings (%)	-0.0024 ***
Share of BOJ purchases (%) x share of BOJ holdings (%)	-0.0002 ***
YCC range of fluctuation upper bound dummy	-0.1978 ***
On-the-run issue dummy	0.9622 ***
First off-the-run issue dummy	0.2576 ***
Cheapest issue dummy	0.0704 ***
Individual issue fixed effect	Yes
Time period fixed effect	Yes
Adjusted R-squared	0.52
Sample size	41,313
Estimation period	From January 2012 to June 2023

2. Relation between the Spotlight Effect and the Share of BOJ Holdings



Sources: QUICK; Japan Bond Trading.
Notes: 1. In panel 1, *** denotes significance at the 1% level. For details of the estimation, see Fukuma et al. (2024).
2. In panel 2, the shaded area denotes the 99% confidence interval.

Panel Data Analysis of Government Bonds by Issue (2): Impact on the Bid-Ask Spreads

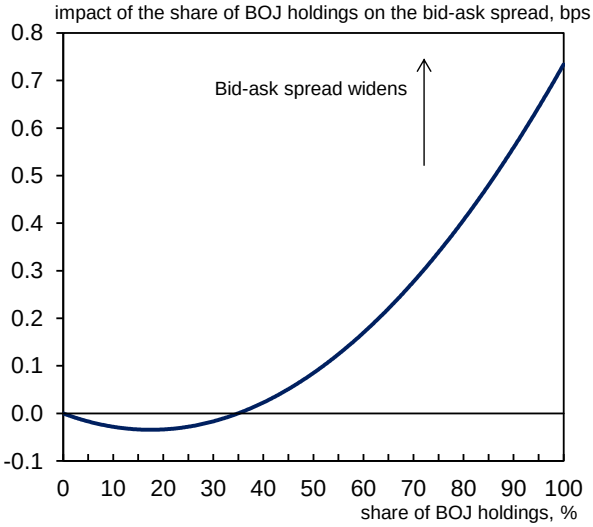
The results of the analysis where the bid-ask spread is the dependent variable show that the purchase of JGBs by the Bank tends to r educe the bid-ask spread (spotlight effect), while the increase in the share of JGBs held by the Bank tends to widen the bid-ask spread (scarcity effect) (Chart A11-3(1)). In addition, the bid-ask spread does not fluctuate much until the share of JGBs held by the Bank reaches about 40 percent; but once it exceeds 50 percent, the bid-ask spread tends to widen in a nonlinear fashion (Chart A11-3(2)).[116]

Chart A11-3: Panel Data Analysis (Impact on Bid-Ask Spreads of JGBs)

1. Estimation Results

	Dependent variable: bid-ask spread	
	(1)	(2)
BOJ purchases dummy	-0.0337 ***	-0.0291 ***
Share of BOJ holdings (%)	0.0062 ***	-0.0039 **
Share of BOJ holdings (%), squared	—	0.0001 ***
YCC range of fluctuation upper bound dummy	-0.5613 ***	-0.4909 ***
On-the-run issue dummy	0.0737 **	0.0806 **
First off-the-run issue dummy	0.0173	0.0286
Cheapest issue dummy	-0.0131	-0.0189
Individual issue fixed effect	Yes	Yes
Time period fixed effect	Yes	Yes
Adjusted R-squared	0.05	0.05
Sample size	19,350	19,350
Estimation period	From October 2015 to June 2023	

2. Impact of the Share of BOJ Holdings



Sources: QUICK; Japan Bond Trading.
Note: In panel 1, *** denotes significance at the 1% level, and ** denotes significance at the 5% level. For details of the estimation, see Fukuma et al. (2024).

[116] A closer look at the estimation results shows that the coefficient for the ratio of the Bank's holdings of JGBs is negative and the coefficient of the squared term is positive.

Panel Data Analysis of Government Bonds by Issue (3): Impact on Yield Curve Distortion

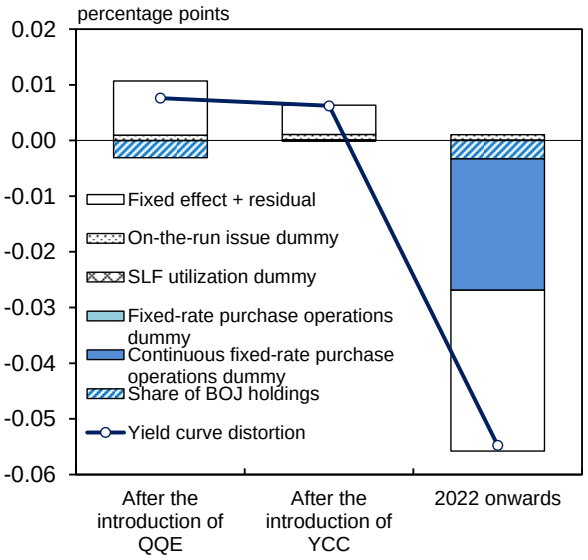
The results of the analysis where the yield curve distortion is the dependent variable show that an increase in the Bank's share of a certain issue of JGB holdings and continuous fixed-rate purchase operations lead to a downward distortion in the yield curve (Chart A11-4(1)). In addition, the decompositions of yield curve distortions for on-the-run 10-year JGBs in each period after dividing the sample period into three intervals – after the introduction of QQE, after the introduction of YCC, and after 2022 – show that the conduct of continuous fixed-rate purchase operations contributed significantly to the downward distortion in the case of the period after 2022 (Chart A11-4(2)).

Chart A11-4: Panel Data Analysis (Impact on Yield Curve Distortion)

1. Estimation Results

	Dependent variable: yield curve distortion
Share of BOJ holdings (%)	-0.0002 ***
Continuous fixed-rate purchase operations dummy	-0.0033 ***
Fixed-rate purchase operations dummy	0.0001
SLF utilization dummy	-0.0425
On-the-run issue dummy	0.0009
First off-the-run issue dummy	0.0018 *
Cheapest issue dummy	-0.0170 ***
Individual issue fixed effect	Yes
Time period fixed effect	Yes
Adjusted R-squared	0.02
Sample size	50,254
Estimation period	From January 2008 to June 2023

2. Breakdown of Factors in the Changes (On-the-Run 10-Year Bonds)



Sources: QUICK; Japan Securities Dealers Association.
Note: In panel 1, *** denotes significance at the 1% level, and * denotes significance at the 10% level. For details of the estimation, see Fukuma et al. (2024).

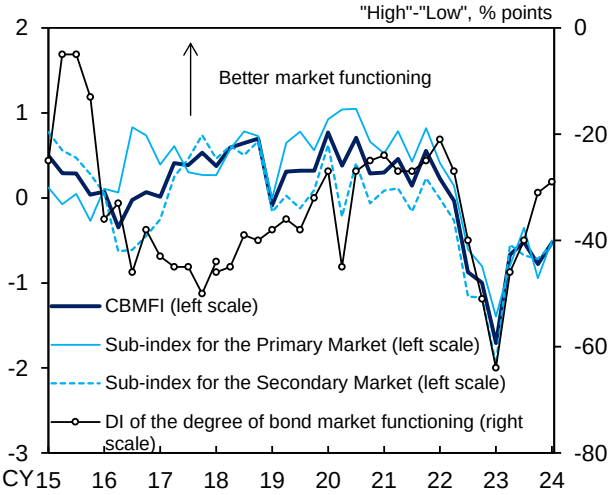
Impact on the Functioning of the Corporate Bond Market

To examine the effects of large-scale monetary easing on the functioning of the corporate bond market, we construct a new composite index that comprehensively reflects the functioning of Japan's corporate bond markets, the Corporate Bond Market Functioning Index (CBMFI), by aggregating various price-, volume-, and trading environment-related measures in both primary and secondary markets (Chart A11-5).[117] We also construct the Primary Market Functioning Index (PMFI) and the Secondary Market Functioning Index (SMFI), using related indicators for each market.

The correlation coefficient between the DI for the degree of bond market functioning taken from the *Bond Market Survey* and the CBMFI shows a positive correlation overall, with a particularly high correlation with the SMFI (Chart A11-6). It can be observed that the SMFI declined significantly when the Negative Interest Rate Policy was introduced in 2016, and when the COVID-19 outbreak occurred in 2020 (Chart A11-5).

We also conduct regression analysis using the CBMFI as the dependent variable, with various indicators, including the functioning of the JGB market and the amount of corporate bond purchases by the Bank, as the explanatory variables. The results of the analysis show that when indicators of the functioning of the JGB market (Japanese interest rate volatility, the JGB yield curve distortion index, and swap-JGB spreads) deteriorate (rise), the corporate bond market is also affected, and its functioning tends to decline (Chart A11-7).

Chart A11-5: Corporate Bond Market Functioning Index (CBMFI)



Sources: Capital Eye; I-N Information Systems; QUICK; Bloomberg; corporate financial releases; Japan Securities Depository Center; Japan Securities Dealers Association; Bank of Japan.
Note: For details of each index, see Ochi and Osada (2024).

Chart A11-6: Correlations between the DI for the Degree of Bond Market Functioning and the CBMFI

	Correlation coefficient
Corporate Bond Market Functioning Index (CBMFI)	0.39 **
Sub-index for the Primary Market	0.20
Primary market spreads	0.48 ***
Primary market issuance	-0.14
Maturity at issuance	0.00
Sub-index for the Secondary Market	0.45 ***
Secondary market spreads	0.56 ***
Transaction volume	0.08
Disagreement on prices	0.22

Sources: Capital Eye; I-N Information Systems; QUICK; Bloomberg; corporate financial releases; Japan Securities Depository Center; Japan Securities Dealers Association; Bank of Japan.
Note: *** and ** denote statistical significance at the 1% and 5% levels, respectively. For details, see Ochi and Osada (2024).

[117] For details of the analysis method and results, see Ochi and Osada (2024).

Furthermore, looking at the effects of corporate bond purchases by the Bank, the coefficient on "BOJ outright corporate bond purchases" is significantly positive in the estimation result for the SMFI. On the other hand, the coefficient on "BOJ corporate bond holdings" is significantly positive in the estimation for the PMFI, and significantly negative in the estimation result for the SMFI. These results suggest that the purchase of corporate bonds by the Bank has had a positive impact on the primary market, such as increased issuance due to an improvement in firms' funding conditions, while it is less likely to have such an impact on the secondary market.

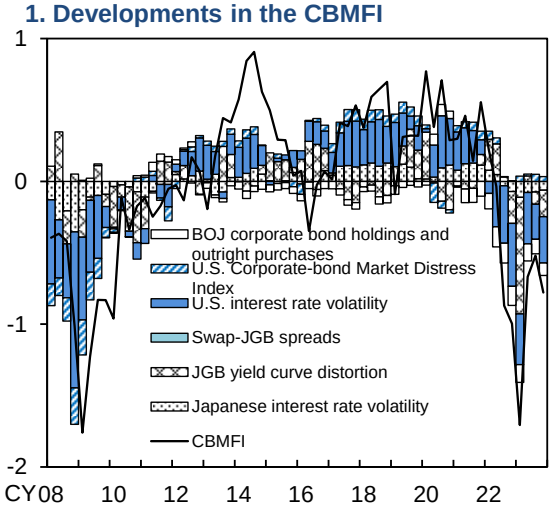
Publications in the Broad-Perspective Review Series

Fukuma, Noritaka, Tomiyuki Kitamura, Kohei Maehashi, Naoki Matsuda, Keita Takemura, and Kota Watanabe (2024), "The Impact of Quantitative and Qualitative Easing and Yield Curve Control on the Functioning of the Japanese Government Bond Market," Bank of Japan Working Paper Series, No.24-E-9.

Ochi, Kaori and Mitsuhiro Osada (2024), "Market Functioning in the Japanese Corporate Bond Market," Bank of Japan Working Paper Series, No.24-E-5.

Chart A11-7: Factors in the CBMFI Developments

1. Developments in the CBMFI



2. Determinants of the CBMFI

Dependent variable:	CBMFI		
	(1)	(2)	(3)
Japanese interest rate volatility	-0.09*	-0.11**	-0.11**
	(0.05)	(0.05)	(0.05)
JGB yield curve distortion	-0.32***	-0.32***	-0.32***
	(0.04)	(0.04)	(0.04)
Swap-JGB spreads	-0.07*	-0.08**	-0.06
	(0.04)	(0.04)	(0.04)
U.S. interest rate volatility	-0.34***	-0.33***	-0.30***
	(0.05)	(0.05)	(0.06)
U.S. Corporate-bond Market Distress Index	-0.04	-0.05	-0.08
	(0.04)	(0.04)	(0.05)
BOJ corporate bond holdings		-0.01	-0.02
		(0.01)	(0.02)
BOJ outright corporate bond purchases			0.31
			(0.31)
Adjusted R-squared	0.618	0.618	0.618
Number of observations	192	192	192

3. Determinants of the Sub-indexes for the Primary and Secondary Markets

Dependent variable:	Sub-index for the Primary Market	Sub-index for the Secondary Market
Japanese interest rate volatility	-0.08	-0.12*
	(0.07)	(0.06)
JGB yield curve distortion	-0.37***	-0.27***
	(0.06)	(0.05)
Swap-JGB spreads	-0.09	-0.04
	(0.06)	(0.05)
U.S. interest rate volatility	-0.32***	-0.28***
	(0.08)	(0.07)
U.S. Corporate-bond Market Distress Index	0.06	-0.21***
	(0.07)	(0.06)
BOJ corporate bond holdings	0.04*	-0.07***
	(0.02)	(0.02)
BOJ outright corporate bond purchases	0.06	0.62*
	(0.44)	(0.37)
Adjusted R-squared	0.433	0.567
Number of observations	192	192

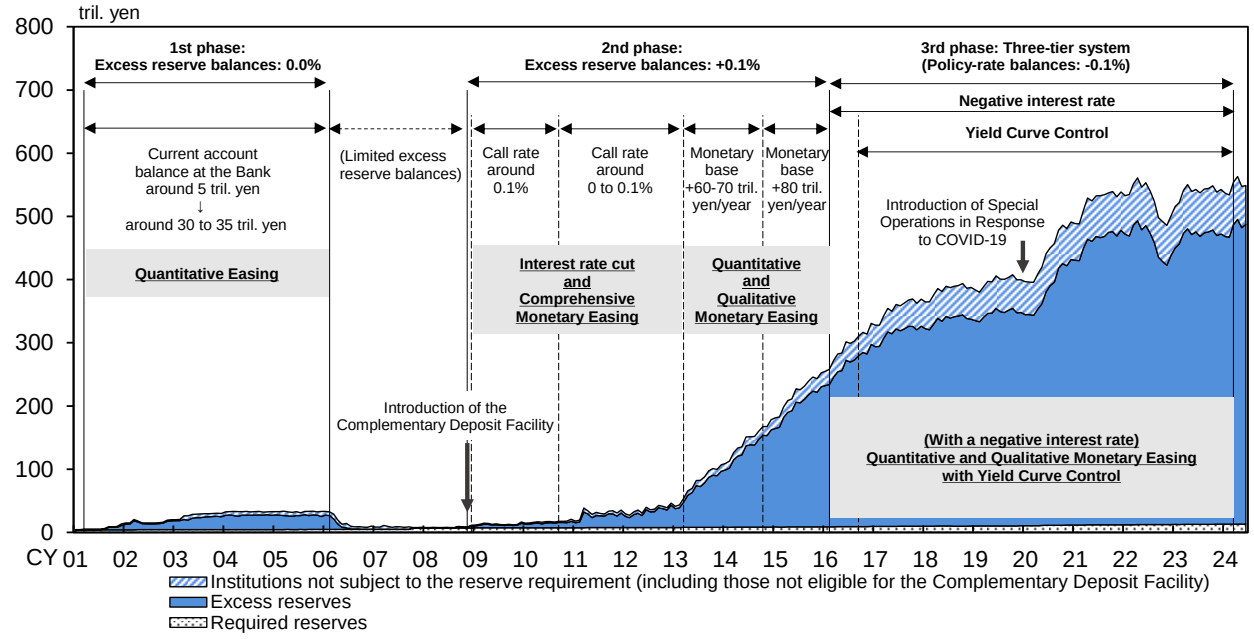
Sources: Capital Eye; I-N Information Systems; QUICK; Bloomberg; corporate financial releases; Japan Securities Depository Center; Japan Securities Dealers Association; FRB NY; LSEG; ICE Data Indices; Bank of Japan; Ochi and Osada (2024).
Notes: 1. Panel 1 is the results of decomposing changes in the indexes based on Model (3) in panel 2.
2. ***, **, and * denote statistical significance at the 1%, 5%, and 10% levels, respectively. Figures in parentheses represent standard errors. The estimation period is from January 2008 to December 2023.
3. For details, see Ochi and Osada (2024).

Appendix 12: Developments in the Money Markets and their Functioning under Large-Scale Monetary Easing

While implementing a variety of unconventional monetary policy measures, the Bank has provided ample reserves that far exceed the levels of required reserves for most of the past 25 years. This period can be broadly divided into (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 Negative Interest Rate Policy period from 2016 to 2024, based on the interest rate on excess reserves (Chart A12-1).

This appendix 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.

Chart A12-1: Amounts of Current Account Balances at the Bank



Source: Bank of Japan.

First Phase: Quantitative Easing Period from 2001 to 2006

Under the Quantitative Easing Policy introduced in March 2001, 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 various operations.

While the majority of financial institutions with current accounts at the Bank held current account balances exceeding the levels of required reserves, trading for the purpose of adjusting the excess and shortage of funds among financial institutions decreased (Chart A12-2). In addition, unlike the second phase and thereafter as discussed below, 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. Under these circumstances, the uncollateralized call rate stayed close to zero percent, and the amounts outstanding in the uncollateralized call market decreased considerably (Chart 1-4-8(1)).

Second Phase: Period from the Introduction of the Complementary Deposit Facility in 2008 to the Introduction of the Negative Interest Rate Policy in 2016

With the Complementary Deposit Facility introduced in November 2008, an interest rate of plus 0.1 percent was applied to excess reserves (current account balances held at the Bank exceeding required reserves), to which no interest had been applied before.

Chart A12-2: Trading Incentives under the Quantitative Easing Period

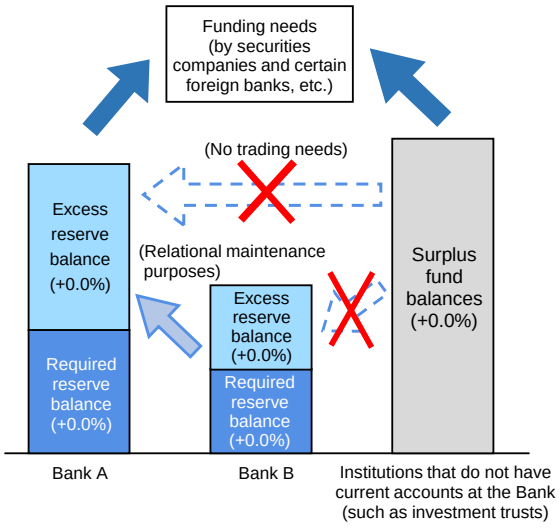
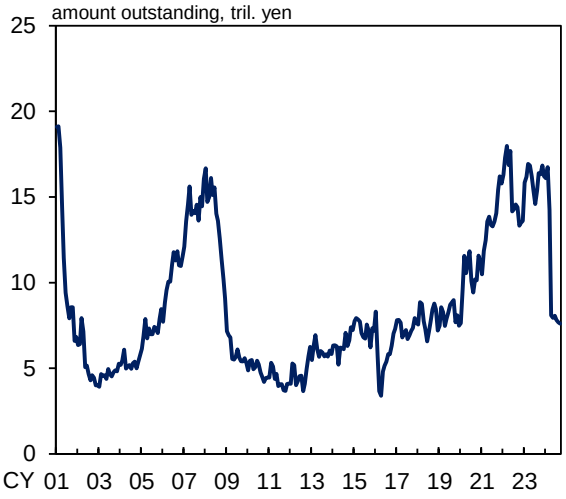


Chart 1-4-8: Amount Outstanding in the Money Market

1. Uncollateralized Call Market



Source: Bank of Japan.

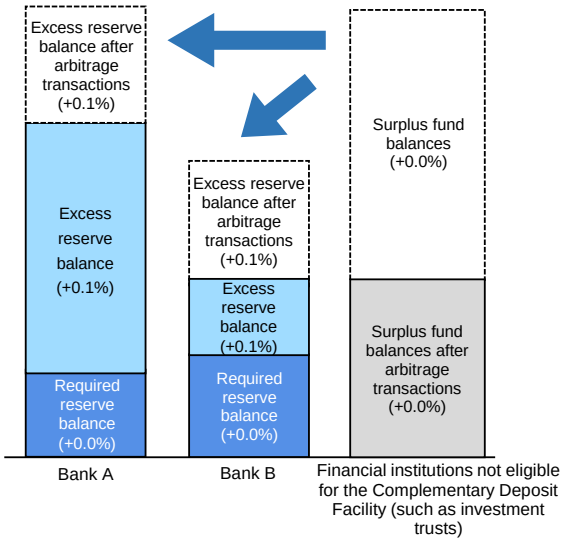
With the Complementary Deposit Facility, trading incentives arose, as financial institutions that held current accounts at the Bank and received interest (hereinafter referred to as "financial institutions eligible for the Complementary Deposit Facility") had an incentive to borrow funds in the money markets at a rate below the interest rate on excess reserves and park the funds in current accounts at the Bank (Chart A12-3). 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.

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 1-4-8(1)).

Third Phase: Negative Interest Rate Policy Period from 2016 to 2024

Under the Negative Interest Rate Policy, which was 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 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

Chart A12-3: Trading Incentives under the Complementary Deposit Facility



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 A12-4).

Under the three-tier system, incentives to carry out arbitrage trading arose among financial institutions eligible for the Complementary Deposit Facility, reflecting uneven distribution of current account balances accumulated before transactions in the money markets. Specifically, while financial institutions with 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 A12-5).

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. 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, a negative fee of minus 0.1 percent served as the lowest bound on lending rates in the uncollateralized call market for investment trusts and others.

In addition, particularly after the introduction of the Special Operations in Response to COVID-19,

Chart A12-4: Overview of the Three-Tier System

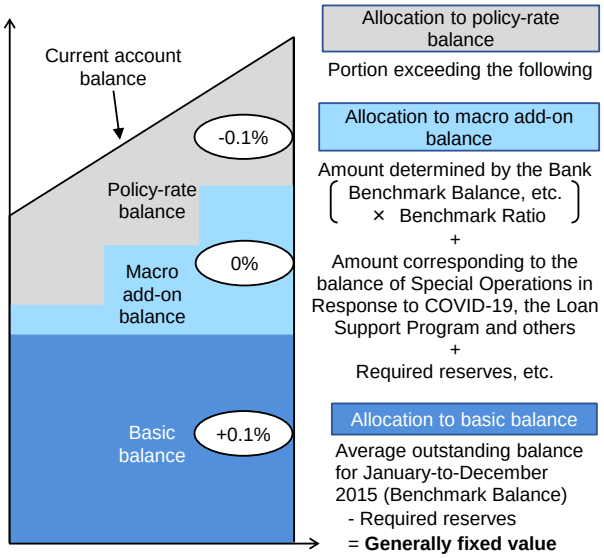
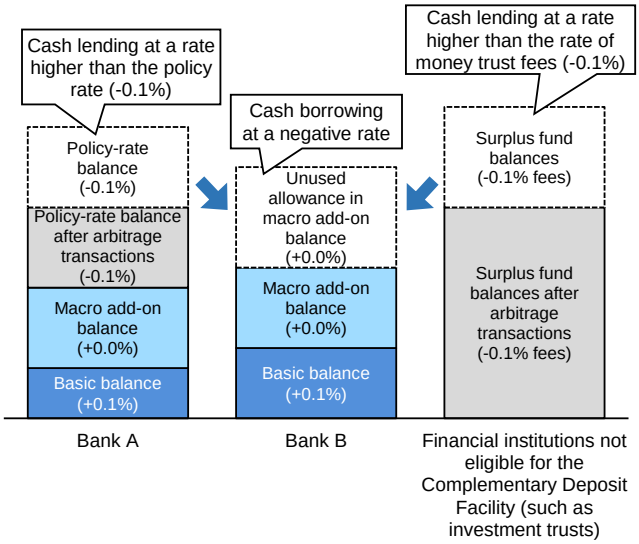


Chart A12-5: Trading Incentives under the Three-Tier System



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,[118] regional banks and other financial institutions that had not been active in the uncollateralized call market began trading, and as a result, market participants were diversified, contributing to an expansion of the reach of uncollateralized call market transactions.[119] Through the expansion of these transaction networks, the functioning of the uncollateralized call market remained robust. 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.

Publication in the Broad-Perspective Review Series

Bank of Japan Financial Markets Department (2024), "Developments in the Japanese Money Markets and their Functioning with Excess Reserves – Including Developments after the Termination of the Negative Interest Rate Policy –," Bank of Japan Research Paper.

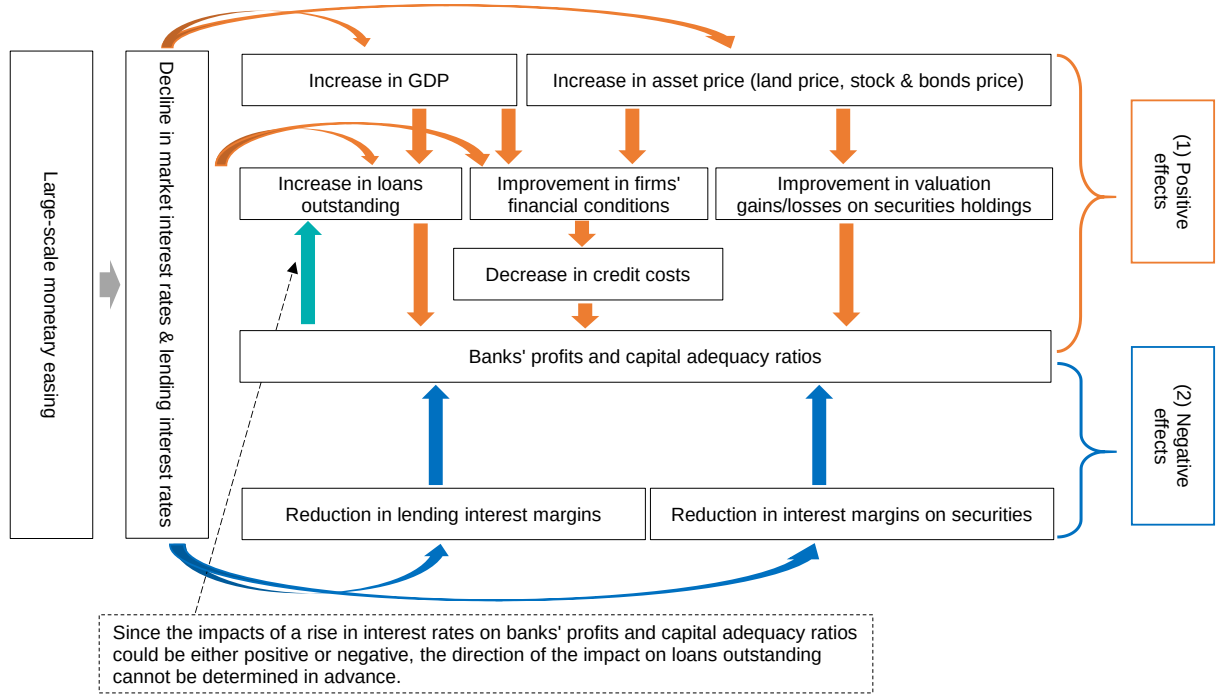
[118] From the viewpoint of adding an incentive to use the Special Operations in Response to COVID-19, the Bank added twice the amount outstanding of funds that counterparties receive under some funds-supplying operations to their macro add-on balances.

[119] Meanwhile, regional banks actively raised funds in the uncollateralized call market after the application of special interest rates under the Special Deposit Facility to Enhance the Resilience of the Regional Financial System.

Appendix 13: Large-Scale Monetary Easing and the Financial System: A Counterfactual Simulation

As discussed in Appendix 10, large-scale monetary easing was likely to push up economic activity to some extent, mainly by decreasing real interest rates and achieving accommodative financial conditions. The improvement in economic activity would have a positive impact on banks in terms of an increase in loans outstanding and a decrease in credit costs (Chart A13-1). On the other hand, the continued low interest rate environment exerted downward pressure on profits of banks by reducing interest margins on loans and securities investment yields. These positive and negative factors need to be considered when assessing the impact of large-scale monetary easing on the functioning of financial intermediation.

Chart A13-1: The Effects of Large-Scale Monetary Easing on the Financial System



Source: Abe et al. (2024).

Keeping these points in mind, the impact on the functioning of financial intermediation of the decline in interest rates, resulting from large-scale monetary easing, was analyzed using a macro-econometric model.[120] Specifically, in the first step, counterfactual developments in real economic variables and stock prices were estimated under an assumption on counterfactual market interest rates in the absence of the large-scale monetary easing, using the Bank's large-scale macroeconomic model (Q-JEM).[121] In the second step, these counterfactual variables were entered into the financial macro-econometric model (FMM) as exogenous variables.[122] The counterfactual simulation was then carried out in the FMM for variables such as banks' loan balance, net interest income, credit cost, and capital adequacy ratio. Differences between the actual and counterfactual values can be regarded as the impact of the decline in interest rates due to the large-scale monetary easing. The following sections explain the methodologies and results of these simulations.

Assumptions on Counterfactual Simulation

First, the counterfactual market interest rates in the absence of large-scale monetary easing were estimated by excluding both stock effects of JGB purchases and the effects of setting the range in

[120] For details of the analysis and results, see Abe et al. (2024).

[121] Q-JEM (Quarterly Japanese Economic Model) is a large-scale macroeconomic model with more than 200 variables that are important for analyzing the Japanese economy, including real, financial, and expectations variables. Each equation is estimated using historical data for Japan. For details, see Hirakata et al. (2019).

[122] The FMM (Financial Macro-econometric Model) is the model that the Bank employs in its macro stress testing to examine the resilience of Japan's financial system in a comprehensive and quantitative manner. For details, see Abe et al. (2023).

the yield curve control with reference to Nakazawa and Osada (2024), as described in Appendix 8.[123] Comparing the counterfactual market interest rates with the actual rates, the actual values are lower than the counterfactual values, and this relationship is more significant in the long-term zone (Chart A13-2).

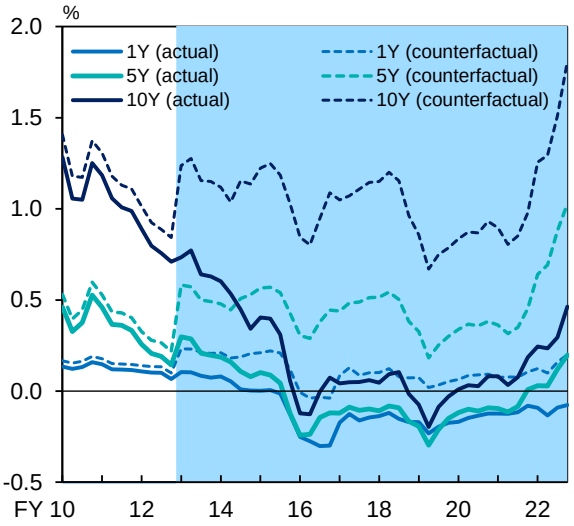
Next, counterfactual paths related to the real GDP, the output gap, stock prices and nominal exchange rates were estimated under the counterfactual market interest rates, using Q-JEM. From the results, Chart A13-3 shows developments in the output gap. The actual values are higher than the counterfactual values, indicating that the large-scale monetary easing improved the output gap by lowering interest rates.

Overview and Results of Counterfactual Simulation

Based on the above assumptions, the impact on the functioning of financial intermediation of the decline in interest rates, resulting from large-scale monetary easing, was analyzed using the FMM, a macro-econometric model with a financial sector. Banks' profits including credit costs, and capital adequacy ratios were simulated given the counterfactual values of market interest rates, real GDP, the output gap, stock prices and nominal exchange rates.

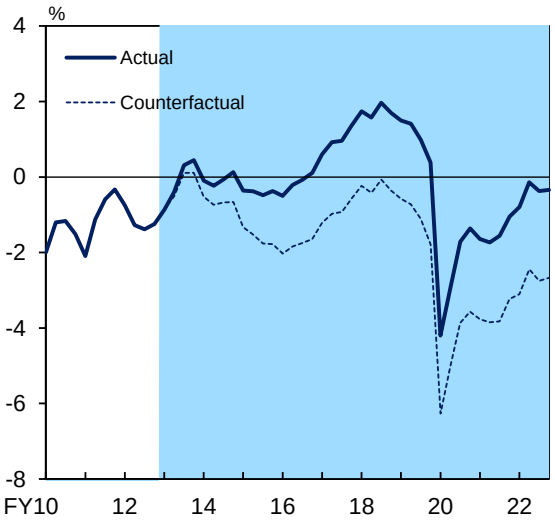
The actual net interest income, affected by the decline in interest rates due to the large-scale monetary easing, is lower than the counterfactual value (Chart A13-4). Similar results are seen in loan profit and securities profit, which are components of net interest income. Regarding loan profit, the loans outstanding was boosted by factors such as the improved economy driven by the decline in interest rates, lower lending interest

Chart A13-2: Counterfactual Developments in Interest Rates



Sources: Abe et al. (2024); Ministry of Finance.
Note: The shaded areas indicate simulation periods. For details of the simulation, see Abe et al. (2024).

Chart A13-3: Counterfactual Developments in Output Gap

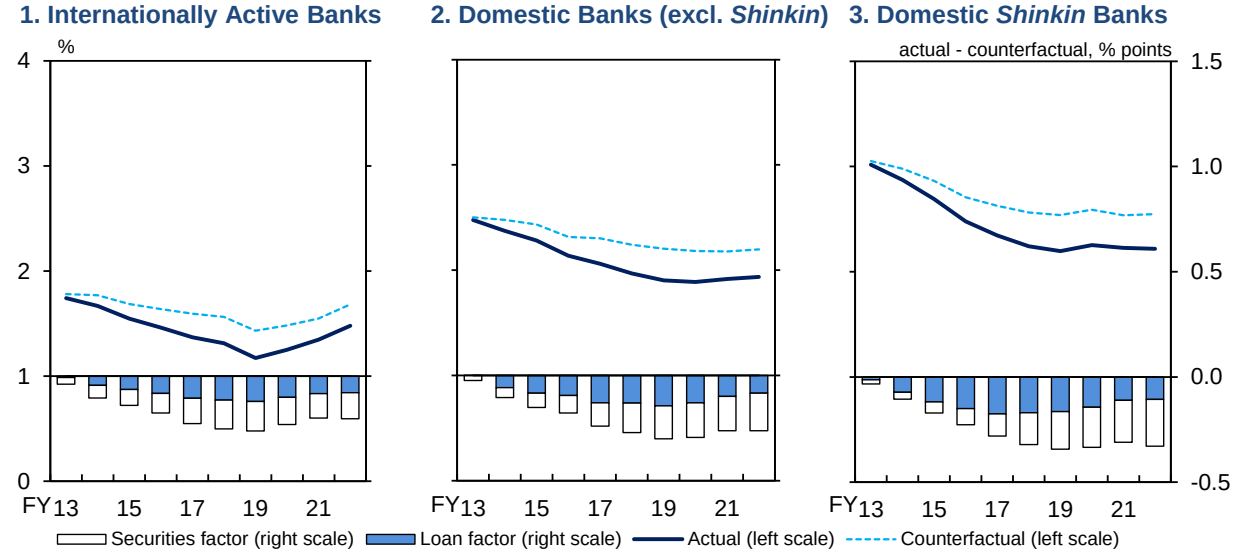


Sources: Abe et al. (2024); Bank of Japan.
Note: The shaded areas indicate simulation periods. For details of the simulation, see Abe et al. (2024).

[123] See Nakazawa and Osada (2024).

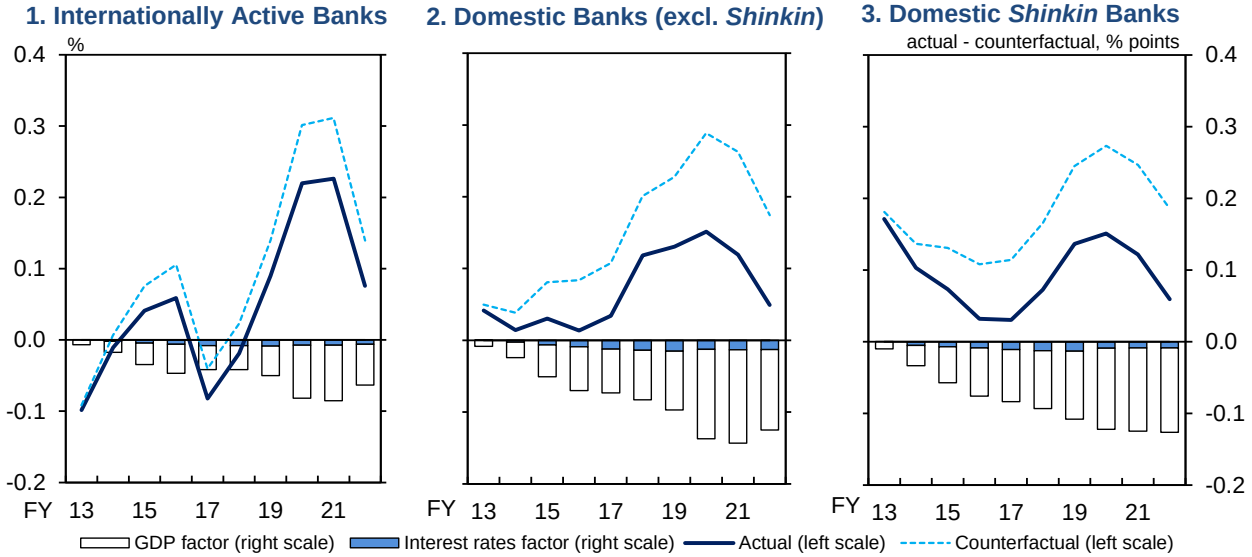
rates, and rising land prices. However, loan-related net interest income was pushed down on the whole as the positive contribution from the increase in loans outstanding was not enough to offset the impact of shrinking loan interest margins, partly due to the limited room for a reduction in deposit rates.

Chart A13-4: Net Interest Income



Sources: Abe et al. (2024); Bank of Japan.
Note: Figures indicate net interest income relative to risk-weighted assets. For details of the simulation, see Abe et al. (2024).

Chart A13-5: Credit Cost Ratios

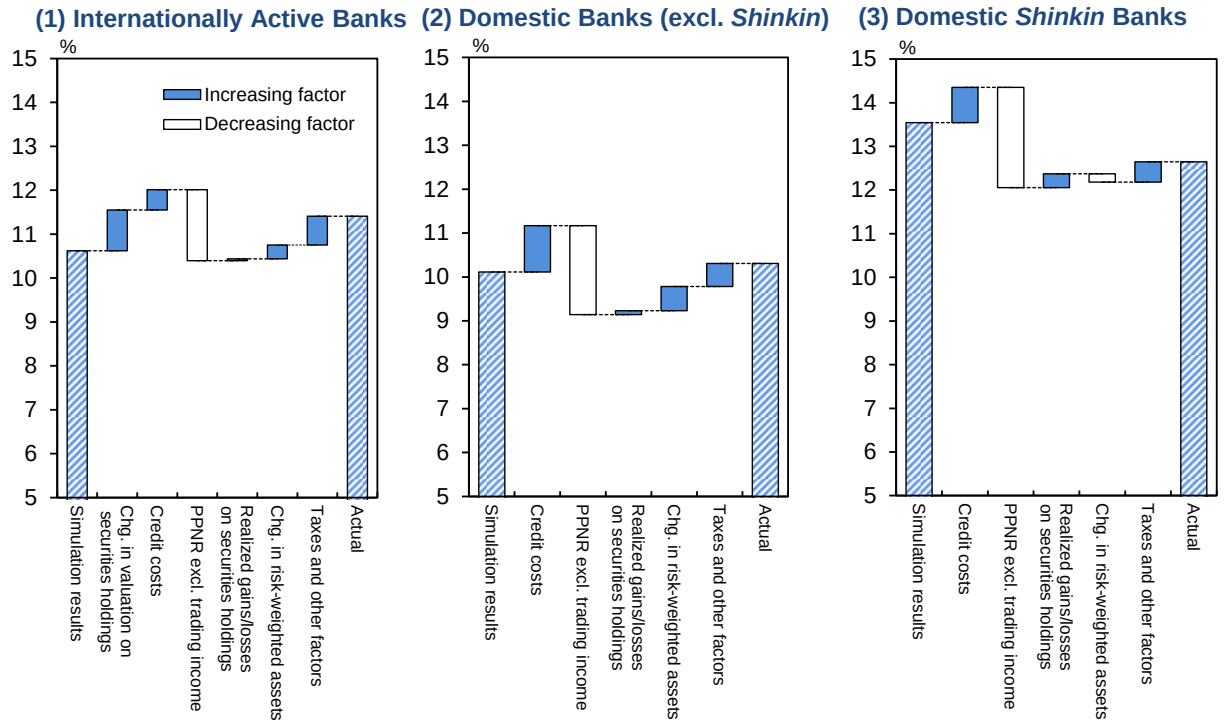


Sources: Abe et al. (2024); Bank of Japan.
Note: For details of the simulation, see Abe et al. (2024).

In contrast, the actual credit cost ratio is lower than the counterfactual value, as the decline in borrowing rates and the accompanying economic recovery improved corporates' financial positions (Chart A13-5). Although the decline in interest rates due to the large-scale monetary easing exerted downward pressure on net interest income, the decrease in credit costs worked in a direction to mitigate the impact of the decline in final profits on capital.

In addition, the actual valuation gains/losses on securities holdings exceed the counterfactual value, indicating that the decline in interest rates due to the large-scale monetary easing had the effect of pushing up bond and stock prices, thereby improving valuation gains/losses on securities holdings.

Chart 1-4-13: Assessments of Policy Effects Using the FMM
3. Capital Adequacy Ratios



Sources: Bank of Japan; Abe et al. (2024).
Note: The chart shows the contribution of each factor to the difference between the actual and counterfactual capital adequacy ratios at the end of the simulation period (fiscal 2022). See Abe et al. (2024) for details of the counterfactual simulation.

Based on these results, the capital adequacy ratios on a regulatory capital basis were simulated (Chart 1-4-13(3)). The decline in interest rates exerted downward pressure on the capital adequacy ratios by reducing the operating profits from core business associated with shrinking interest margins. On the other hand, the reduced credit costs due to the improvement in corporates' financial positions and the improved valuation gains/losses on securities holdings reflecting rising asset prices exerted upward pressure on the capital adequacy ratios. The results indicate that the capital adequacy ratio was not necessarily pushed down significantly by the decline in market interest rates.

Furthermore, the results suggest that the improving economy and lowering lending interest rates increased the corporate sector's demand for funding, leading to an increase in loans outstanding, and also contributed to the facilitation of financial intermediation by improving corporates' financial positions and reducing their credit risk, thereby promoting smooth lending transactions between firms and banks. For housing loans, similar to the case of the corporate sector, the improving income environment due to the improvement in the economy, lower lending interest rates, and higher asset prices including land prices, led to an increase in loans outstanding as households' demand for borrowing increased and their credit risk was suppressed.

The quantitative results of the analysis depend on the construction of the model, such as the equation specification, and should be interpreted with considerable latitude. However, the results of the counterfactual simulation, which takes into account the effects on the real economy and the household and corporate sectors, suggest that the decline in interest rates resulting from the large-

scale monetary easing likely contributed to the facilitation of financial intermediation, although it also affected the shrinking interest margins of financial institutions.

Publications in the Broad-Perspective Review Series

Abe, Nobuhiro, Naohisa Hirakata, Yuto Ishikuro, Yosuke Koike, Yuki Konaka, and Yutaro Takano (2024), "Counterfactual Simulation of the Effect of Large-Scale Monetary Easing on Japan's Financial System," Bank of Japan Working Paper Series, No.24-E-8.

Bank of Japan Financial System and Bank Examination Department (2024), "The Effects of Monetary Easing on Japan's Financial System," Bank of Japan Research Paper.

Nakazawa, Takashi and Mitsuhiro Osada (2024), "The Bank of Japan's Large-Scale Government Bond Purchases and the Formation of Long-Term Interest Rates," Bank of Japan Working Paper Series, No.24-E-10.

Appendix 14: Impact of Monetary Easing on the Supply Side of the Economy, Including Productivity

Regarding the impact of monetary easing on the supply side of the economy, particularly productivity, previous research has presented divergent views. Some argue that monetary easing leads to productivity improvements through factors such as the accumulation of physical and human capital, as well as increases in research and development (R&D) investment. On the other hand, there is the argument that monetary easing preserves inefficient firms, leading to distortions in resource allocation, which in turn lowers productivity.[124] It has been pointed out that the long-term impact of monetary policy on the macro-economy involves various theoretical channels and should be empirically examined.

Chart A14-1: Effects of Monetary Easing on Long-Term Macroeconomic Trends

Issue	Positive effects identified in the literature	Negative effects identified in the literature
Productivity	• Promote R&D investments • Technological advances along with increase in production • Improve workers' skill along with reduced unemployment • Resource reallocation to growing firms	• Preserve inefficient firms • Distortions in resource allocation
Capital/ Labor	• Promote capital accumulation • Prevent prolonged period of unemployment	• Downward shift in growth path triggered by expectations of asset bubbles

Review of the Literature

Studies suggesting that monetary easing has a long-term positive impact on the economy argue that it has a lasting upward effect on macro productivity through increased R&D investment.[125] It has also been claimed that it allows firms with high profitability and growth potential to expand their share of production resources, thereby enhancing overall productivity.[126] Additionally, some assert that capital accumulation progresses under accommodative financial conditions.[127] Furthermore, although not directly related to monetary policy, studies suggest that developments in demand have a long-term influence on the economy. These studies include analyses indicating that technological advances

[124] For more information on recent trends in productivity in Japan and the factors behind these fluctuations, see Nakamura, Kaihatsu, and Yagi (2019), and Yagi, Furukawa, and Nakajima (2022).

[125] See Ma and Zimmermann (2023).

[126] See Baqaee, Farhi and Sangani (2024).

[127] See Yellen (2016).

accompanying increased production volumes and the enhancement of workers' skills due to reduced unemployment contribute to productivity growth (Chart A14-1).[128]

In contrast, studies suggesting that monetary easing has a negative impact argue that it preserves inefficient firms, leading to distortions in resource allocation, which in turn depress productivity. [129] Moreover, some claim that prolonged accommodative financial conditions, coupled with a growing perception that future asset bubbles could emerge, lead to a downward shift in the economic growth path through a slowdown in capital accumulation.[130]

There is therefore currently no theoretical consensus on the impact of monetary easing on productivity, and empirical analyses focusing on Japan remain limited. The following sections examine the relationship between monetary easing and productivity using macro-level data and firm-level microdata.

Empirical Analysis Using Macro Data

The analysis using macro data aims to: (1) identify monetary policy shocks from macro data, and (2) measure the impact of these shocks on productivity and other economic factors.

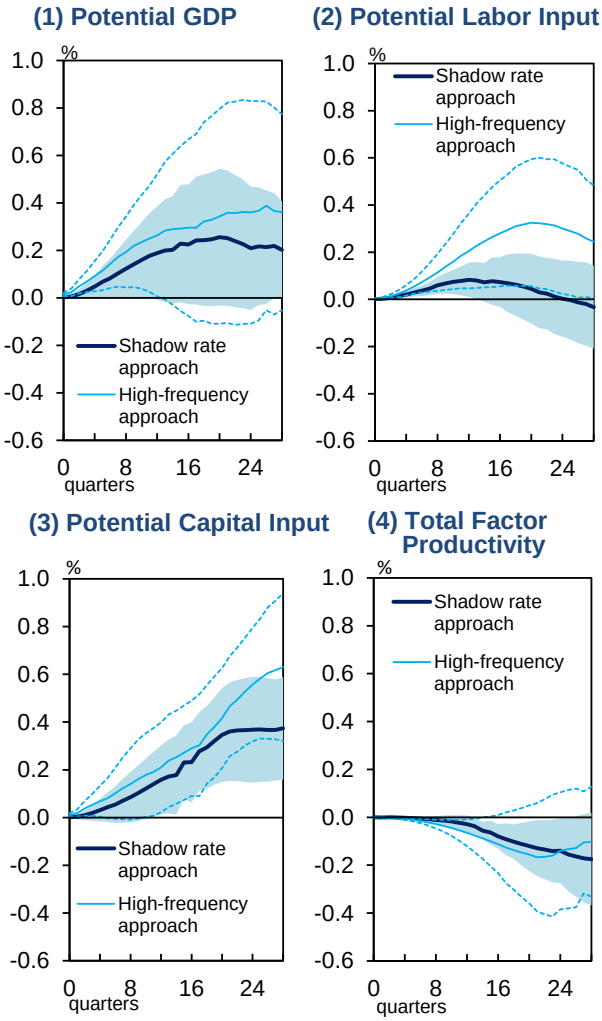
Specifically, to ensure robustness in the identification of monetary policy shocks, two approaches are employed: one using a short-term sign-restricted model on shadow rates (shadow rate approach), and another using high-frequency financial market data (high-frequency approach) (Chart 1-4-17(1)). [131] Here, monetary policy

Chart 1-4-17: Effects of Monetary Policy Shocks

1. Analytical Framework

- Monetary policy shocks in Japan are identified using two approaches: one based on the shadow rate and another using high-frequency data.
- The impact of identified monetary policy shocks on potential GDP, potential labor input, potential capital input, and total factor productivity (TFP) is estimated using the local projections method.

2. Estimation Results



Sources: Ministry of Economy, Trade and Industry; Ministry of Internal Affairs and Communications; Cabinet Office; Bank of Japan; Bloomberg; Consensus Economics Inc., "Consensus Forecasts"; QUICK.
Note: The panels present the cumulative impulse responses to a 1 standard deviation monetary easing shock, and show the percentage deviation from the pre-shock level. The shaded areas and dotted lines denote 90 percent confidence intervals.

[128] For studies related to technology levels, see Stadler (1990); for research on skill improvement among workers, see Pissarides (1992).

[129] See Banerjee and Hofmann (2018).

[130] See Guerron-Quintana, Hirano, and Jinnai (2023).

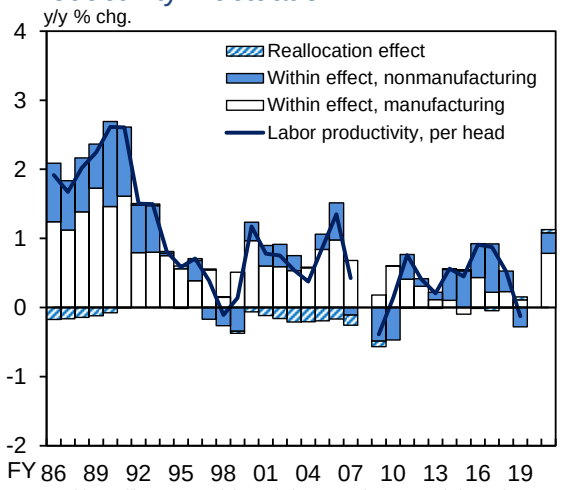
[131] For details of the estimation methods and results, see

shocks refer to policy movements that cannot be explained by economic, price, or financial developments; for example, prolonged low shadow rates are identified as negative shocks (monetary easing shocks) to shadow rates. Then, the analysis measures the impact of the identified monetary policy shocks on potential GDP and its components (potential capital input, potential labor input, and total factor productivity (TFP)), using the local projection method.

Estimated impulse responses through the method presented above show that, in both approaches, monetary easing shocks significantly increase the amount of potential capital input (Chart 1-4-17(2)). As for potential labor input, the high-frequency approach shows an upward effect, while the shadow rate approach shows only a short-term and temporary increase, with no statistically significant impact in the long term. The high-frequency approach indicates no statistically significant impact on TFP, while the shadow rate approach shows a downward effect. When examining the overall impact on potential GDP, the evaluation of statistical significance is mixed among the models, and the analysis suggests only the possibility of a slightly positive effect.

Furthermore, as a separate analysis not directly identifying monetary policy effects, this section examines the factors driving macro labor productivity fluctuations through inter-industry labor mobility over the period. Specifically, after calculating labor productivity by industry, the analysis decomposes the changes in macro labor productivity into "within effects" (i.e., how changes in productivity within each industry affect macro productivity), and "reallocation effects" (i.e., how changes in the employment share within each

Chart A14-2: Determinant of Labor Productivity Fluctuation



Sources: Cabinet Office; RIETI; Ministry of Finance; Fukunaga et al. (2024a).
Note: See Fukunaga et al. (2024a) for details of estimation. Figures are 7-year backward moving averages. Fiscal 2008 (the year of the global financial crisis) and fiscal 2020 (the year of the expansion of COVID-19) are excluded from figures.

Haba et al. (2024a).

industry affect macro productivity).[132] The reallocation effect contributes positively if labor mobility shifts toward growing industries.

The analysis results reveal that Japan's labor productivity growth rate was mostly explained by within-industry effects (Chart A14-2). Regarding the reallocation effect, it could be pointed out that, (1) in the early 2000s, the increasing share of employment in relatively low-productivity non-manufacturing industries acted as a downward pressure on the macro productivity growth rate, though its extent was limited; and (2) during the period of large-scale monetary easing, this downward pressure ceased to be observed.

Empirical Analysis Using Firms' Micro Data

Next, this section examines the impact of the low interest rate environment on the real economy, using the firm-level micro data.[133]

Using the methods in previous studies, the analysis extracts "firms that survive with support from banks or other entities despite performing poorly with no prospect of recovery" (Chart A14-3(1)).[134] After rising in the first half of the 1990s, the share of these firms among large firms declined through the mid-2000s and has been hovering at a low level (Chart A14-3(2)). In addition, recently, the share of these firms among small- and medium-sized enterprises (SMEs) has been hovering at a low level (it should be noted that the time series is somewhat shorter due to data limitations) (Chart A14-3(3)).

[132] For details of the estimation methods and results, see Fukunaga et al. (2024a).

[133] For details of the method of the analysis and results, see Makabe and Yagi (2024).

[134] In Makabe and Yagi (2024), the method for extracting "firms that survive with support from banks or other entities despite performing poorly with no prospect of recovery" references Yamada et al. (2023), Albuquerque and Iyer (2023), and Banerjee and Hofmann (2018).

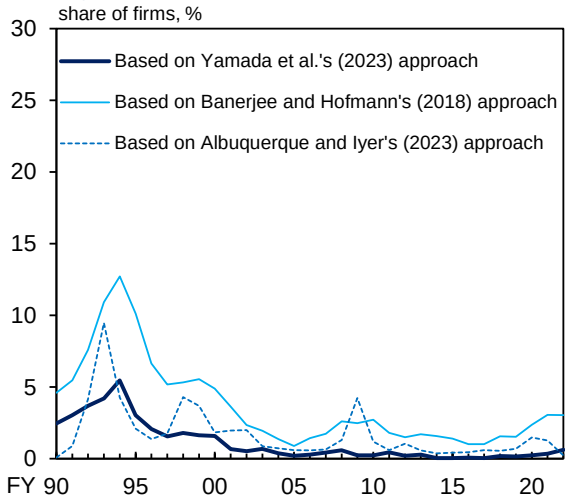
Chart A14-3: Firms that Survive with Support from Banks or Other Entities despite Performing Poorly with No Prospect of Recovery

1. Definition

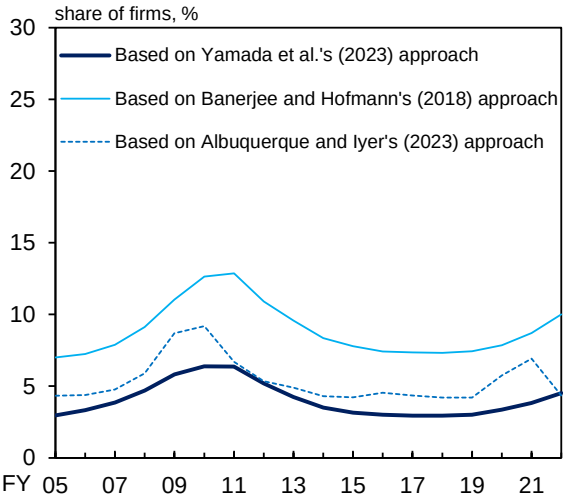
	Literature		
	Yamada et al. (2023)	Banerjee and Hofmann (2018)	Albuquerque and Iyer (2023)
Requirement	Firms that meet three requirements below for three consecutive years	Firms that meet two requirements below for three consecutive years	Firms that meet two requirements below for two consecutive years
Interest rates	Rate of interest paid < Average contracted interest rate on loans (stock base) or Current term borrowings > Previous term borrowings	——	——
Solvency, Fundamentals	ICR < 1	ICR < 1	ICR < 1 and Leverage ratio > Median firm in the same industry
Growth potential	Founded at least ten years before	Founded at least ten years before	Sales growth < 0

Source: Literature mentioned above.

2. Large Firms



3. Small and Medium-Sized Firms



Sources: Bank of Japan; Development Bank of Japan, "Corporate Financial Databank"; CRD Association.
Note: For details, see Makabe and Yagi (2024).

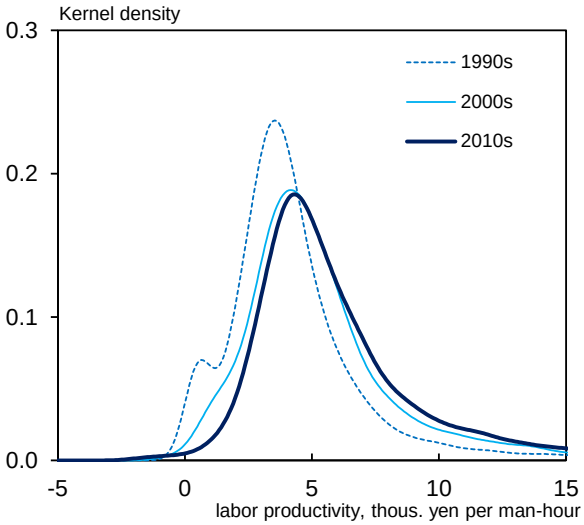
Therefore, it can be noted that, even under the recent large-scale monetary easing, there is no increase in the share of firms which may survive with support from banks or other entities, as ones identified in previous studies.

On the other hand, productivity heterogeneity among large firms has increased over the past 25 years (Chart 1-4-19(1)). This can be considered evidence that some firms have raised their growth potential mainly by exploiting global demand. These firms seem to be enhancing productivity by promoting internal renewal, such as reevaluating priorities among business domains and leveraging M&A in response to changes in the external environment. At the same time, the data also suggest that a fair number of firms continue to have low productivity. The distributions for all SMEs also show some variation in productivity across firms (Chart 1-4-19(2)).

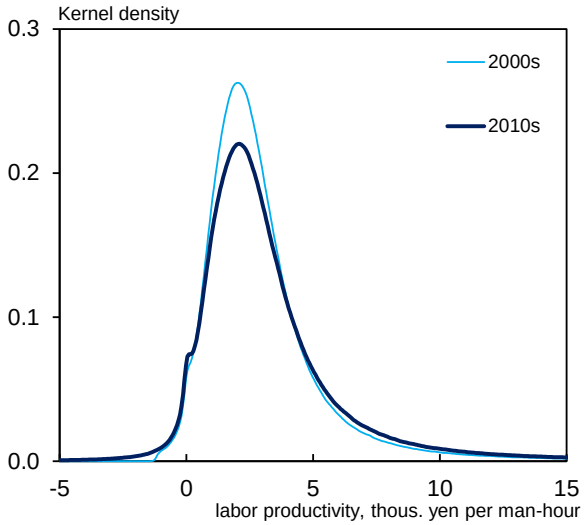
It is difficult to identify the reason why these low-productivity firms have been surviving. Analysis using corporate financial data suggests that the number of firms experiencing persistently low productivity may have increased under the low interest rate environment since the late 1990s, but the degree of the impact is not necessarily large. In addition, since the late 1990s, the low interest rate environment has continued in Japan, and various support measures for firms have also been introduced. In this regard, previous studies have pointed out that these support measures have led to the emergence and survival of low productivity firms,[135] but since the various types of support measures and the low interest rate policy were implemented during the same period, it is not easy to distinguish the effects of the two.

Chart 1-4-19: Distribution of Labor Productivity of Individual Firms

1. Large Firms



2. Small and Medium-Sized Firms



Sources: Cabinet Office; Development Bank of Japan, "Corporate Financial Databank"; CRD Association.
Note: For details, see Makabe and Yagi (2024).

[135] See Morikawa (2021), for example. In addition, Atkinson (2020) points out that SMEs in Japan are favored by policy measures, and that incentives may exist to maintain the status of small businesses without growth.

In summary, at least from the macro and micro empirical analyses using currently available data, no clear conclusions about the impact of large-scale monetary easing on the supply side of the economy have been reached, either positive or negative. As noted above, various views can be found in previous studies, and further research and discussion is required on both theoretical and empirical aspects.

Publications in the Broad-Perspective Review Series

Fukunaga, Ichiro, Yoshihiko Hogen, Yojiro Ito, Kenji Kanai, and Satoshi Tsuchida (2024a), "Potential Growth in Japan: Issues on Its Relationship with Prices and Wages," Bank of Japan Working Paper Series, No.24-E-16.

Haba, Shunsuke, Yuichiro Ito, Shogo Nakano, and Takahiro Yamanaka (2024a), "Assessing the Long-Term Impact of Monetary Policy," Bank of Japan Working Paper Series, No.24-E-19.

Makabe, Yoshibumi and Tomoyuki Yagi (2024), "Firms' Interest Payment Burden and Productivity under a Low Interest Rate Environment," Bank of Japan Working Paper Series, No.24-E-20.

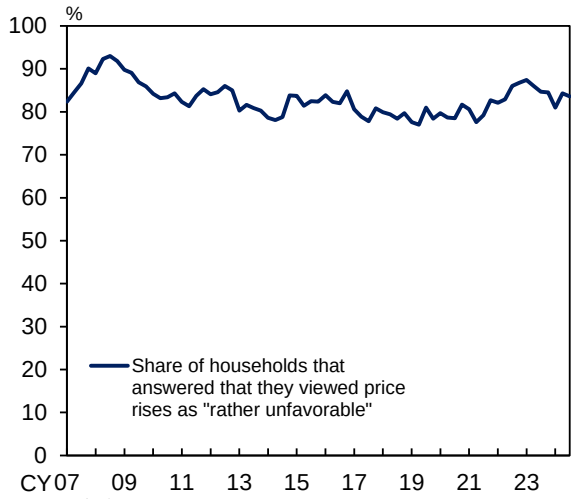
Appendix 15: Economic Implications of Moderate Price Increases

Perspectives of Households and Firms on a "State Where Both Wages and Prices Will Not Increase Easily"

In order to understand how households and firms perceive wage and price increases, the Bank conducted (1) the *Opinion Survey on the General Public's Views and Behavior* for households, and (2) the *Survey regarding Corporate Behavior since the Mid-1990s* for firms, which is a large-scale survey covering around 2,500 nonfinancial corporations nationwide of varying industries and sizes.

Looking at the survey results, the majority of households responded "rather unfavorable" to the question about price increases in themselves (Chart 2-2-2). However, more respondents considered a state of "prices and income both rising moderately" to be preferable to a state of "prices and income both remaining almost the same" (Chart 2-2-3). The survey results for firms also show that more firms consider a state of "prices and wages rising moderately" to be preferable for their business activities.

Chart 2-2-2: Households' View on Price Rises



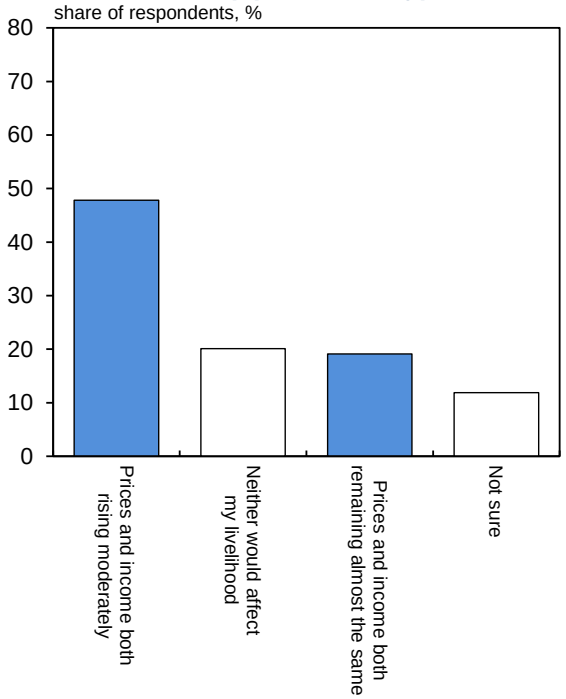
Source: Bank of Japan.
Note: For details, see the *Opinion Survey on the General Public's Views and Behavior*.

In the question to firms about why respondents prefer a state where both prices and wages rise moderately, a particularly large number of firms selected as the reason the "positive effects of higher wages on household sentiment and consumption" or the "ease in passing on costs to prices and securing profits" (Chart A15-1). Besides this, a relatively large number of firms selected reasons such as "ease in adjusting selling prices and wages," "no need for cost cuts to avoid raising prices, enabling active fixed investment and wage hikes," or (especially in manufacturing industries) the "smaller price gap between home and abroad, enabling stable exchange rates."

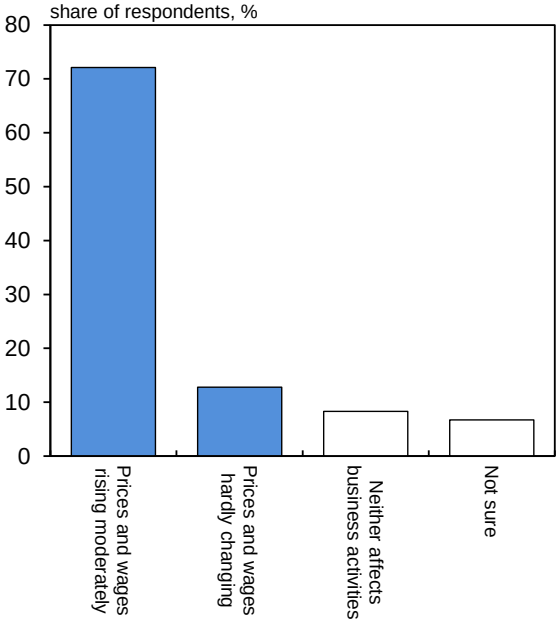
The perspectives of households and firms mentioned above suggest the possibility that achieving a state where wages and prices increase moderately can have an impact on the behavior of economic agents in the long run, including a positive impact through the increase in proactive investment.

Chart 2-2-3: Preferences with Regard to Prices, Income, and Wages

1. Households (*Opinion Survey*)

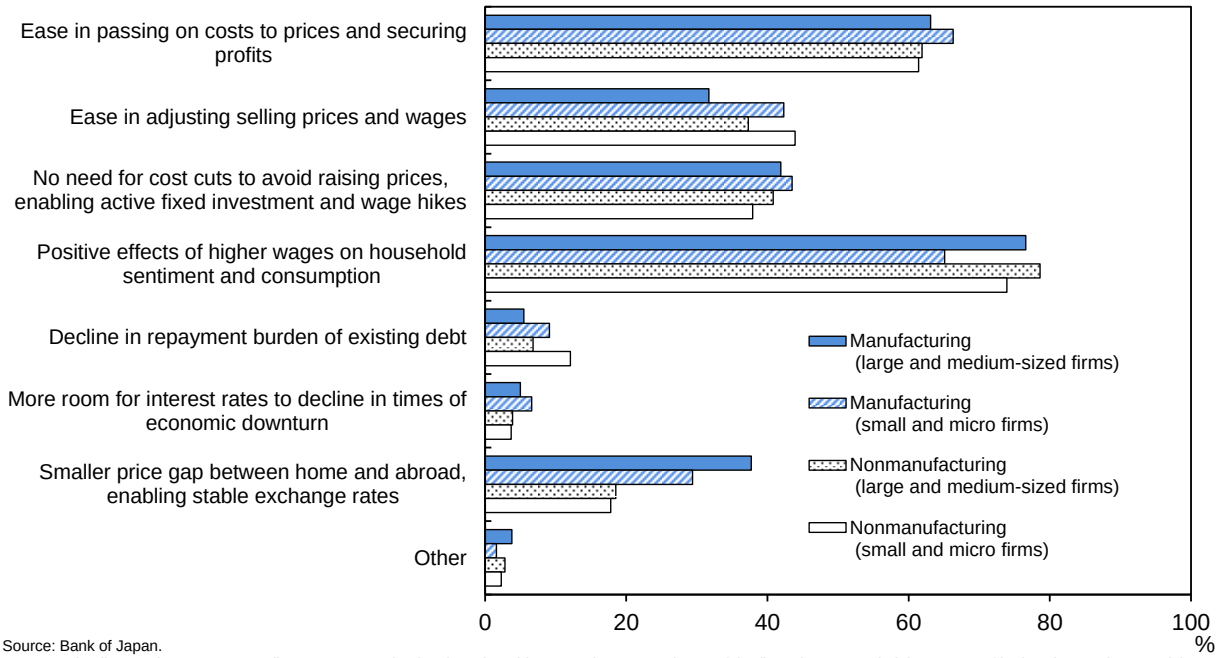


2. Firms (Corporate Survey)



Source: Bank of Japan.
Note: For details on panel 1 and 2, see the *Opinion Survey on the General Public's Views and Behavior* (September 2024 Survey) and the *Survey regarding Corporate Behavior since the Mid-1990s*, respectively.

Chart A15-1: Reasons for Preferring a State in Which Prices and Wages Rise Moderately (Corporate Survey)



Source: Bank of Japan.
Note: For details, see the *Survey regarding Corporate Behavior since the Mid-1990s*. Figures are shares of the firms that responded that a state of both "prices and wages rising moderately" is preferable in Chart 2-2-3(2). All applicable reasons were allowed.

Overview of Academic Discussions on the Issue of Optimal Price Increases

The impact of price fluctuations on social welfare, as illustrated by the responses of households and firms mentioned above, is an important issue in macroeconomics and has been assessed from various perspectives. On the issue of desirable inflation rates, up until the 1990s, there were a large number of studies arguing for the costs of inflation, based on the opportunity costs of holding money (Chart A15-2).[136] After around 2000, a central view shifted towards the argument that it was desirable for prices to remain constant under conditions of price rigidity. Since the Global Financial Crisis and the subsequent period of low inflation in major economies, academic arguments have turned to the costs of deflation and low inflation, such as the adverse effects of the zero lower bound on nominal interest rates and wage rigidity. Throughout the chronological developments presented above, various studies have been conducted on the issue of "optimal

[136] For details, see Sugioka et al. (2024).

Chart A15-2: Literature regarding Optimal Inflation Rate

1. Costs of Inflation

Opportunity Costs of Holding Money (Friedman [1969])
Positive nominal interest rates induce the opportunity costs of holding money.

Non-Neutrality of Taxation (Feldstein [1999])
Taxation based on nominal values leads to a distortion of effective tax rates.

2. Costs of Price Fluctuation

Menu Costs (Levy et al. [1997])
Firms have to input resources – menu costs – in order to change their product prices, which leads to welfare losses.

Price Rigidity (King and Wolman [1999])
Under the environment of price rigidity, general price fluctuations lead to a distortion of relative prices, which in turn reduces the efficiency of economic activity.

Money Illusion (Fisher [1928])
Fluctuations in nominal values cause agents to fail in their decision-making.

3. Costs of Deflation/Low Inflation

Nominal Wage Rigidity (Kim and Ruge-Murcia [2009])
Nominal wage rigidity limits the room for a decline in real wages during an economic downturn, which leads to a decline in the demand for labor.

Zero Lower Bound on Nominal Interest Rates
(Coibion, Gorodnichenko, and Wieland [2012])
Zero lower bound on nominal interest rates limits the room for monetary policy, which incurs the adverse effects on economic stability.

Tobin Effects (Tobin [1965])
Augmenting the value of money leads to a stagnation of investments to real assets.

Debt Deflation (Fisher [1933])
An unexpected increase in real debt holdings leads to a decline in demand through stagnation in the consumption of debt holders.

Note: For details, see Sugioka et al. (2024).

inflation rates." However, the results of these studies have varied widely, and thus no academic consensus has yet been reached.

Under these circumstances, the following arguments have been presented in recent years on the issues of price rigidity, nominal wage rigidity, and the zero lower bound on nominal interest rates, which are key areas of focus in academic research on desirable inflation rates.

First, in the conventional discussion on price rigidity – the tendency for prices of goods and services not to be immediately adjusted to the balance of supply and demand – when firms face an increase in production costs due to an increase in general prices, some of them are unable to pass these costs on to sales prices due to price rigidity. As a result, distortions emerge in relative prices among firms, leading to a decrease in production efficiency within society as a whole through distortions of relative demand. From this perspective, zero inflation, which minimizes relative price fluctuations, is considered to lead to efficient resource allocation by preserving the signaling function of prices.

From another perspective, there is research arguing that an environment in which general price inflation rates remain close to zero for a long time, such as in Japan, can lead to social costs as a whole.[137] The research argues that in such an environment, people come to expect that prices will not rise, which makes them more sensitive to price increases. Under these circumstances, firms' practice of keeping their product prices unchanged becomes reinforced and, in turn, they restrain development of costly new products – ultimately imposing costs on society as a whole. Moreover, recent research points out that moderate price

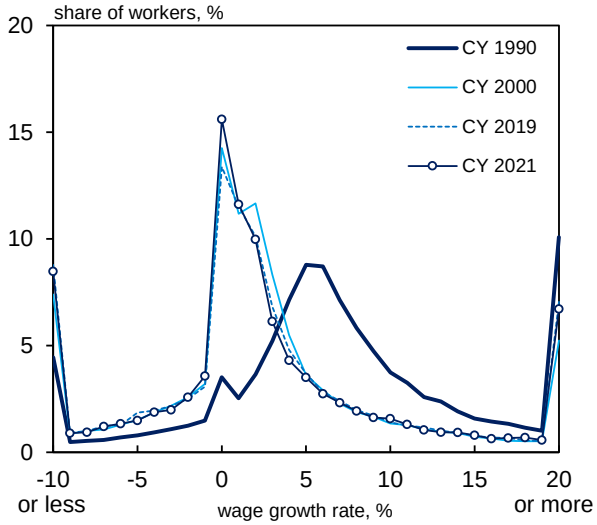
[137] For details, see Watanabe (2022) and Watanabe (2024).

increases can be desirable for social welfare, taking into account the heterogeneity of products and firms in an environment of price rigidity.[138]

Second, in discussions on the issue of nominal wage rigidity, the "downward nominal wage rigidity" – the tendency for it to be difficult for nominal wages to decline during economic recessions or similar periods – has long been pointed out. The discussion suggests that in an environment of limited nominal wage adjustment, maintaining the room for real wage adjustment through positive inflation rates may contribute to improving social welfare.[139]

Moreover, in recent years, it has been noted that downward nominal wage rigidity can lead to upward nominal wage rigidity due to firms' fears that wages will remain high during periods such as economic downturns, which can result in the tendency for nominal wages not to change flexibly.[140] This trend is particularly pronounced in deflationary or low inflation environments, where nominal wage downward rigidity is more likely to be encountered. In fact, data on Japan's wage growth distribution since the 2000s, when inflation remained low, suggests that wage growth has clustered close to zero (Chart A15-3).[141] In an environment with wage rigidity, it can be difficult to adjust wages according to the productivity levels of individual workers or firms. Recent discussions have suggested that greater wage heterogeneity across workers and firms could promote skill development and proactive job mobility.[142] It has also been noted that achieving positive inflation

Chart A15-3: Distribution of Nominal Wage Growth Rate



Sources: Date et al. (2024); Ministry of Health, Labour and Welfare; Ministry of Internal Affairs and Communications.
Note: Estimated by Date et al. (2024). Wages are monthly salary basis of full-time workers.

[138] For details, see Adam and Weber (2019, 2023), and Inokuma, Katagiri, and Sudo (2024).

[139] For details, see Tobin (1972).

[140] See, for example, Daly and Hobijn (2014), Genda (2017) and Hirata, Maruyama, and Mineyama (2020).

[141] For details, see Date et al. (2024).

[142] See Watanabe (2023) and Itoh (2024), for example.

rates may enhance the signaling function of wages and prices, which in turn may make resource allocation more efficient.

Third, in discussions of the zero lower bound on nominal interest rates, it has been noted that the emergence of a persistent decline in prices in an environment of the zero lower bound on nominal interest rates can lead to the risk of stagnation in consumption and investment due to a rise in real interest rates. From the perspective of reducing this risk, it has been argued that positive inflation rates are desirable. Although the unconventional monetary policies implemented by central banks in various countries can be considered to have had a certain degree of effectiveness, their effects remain uncertain and may lead to side effects. As a result, the welfare loss associated with the zero lower bound on nominal interest rates remains an important concern in the conduct of monetary policy.

As outlined above, research in recent years suggests that positive inflation rates can enhance the signaling function of wages and prices, leading to a more efficient allocation of resources. Moreover, it has also been noted that, even considering the effectiveness of unconventional monetary policies, the zero lower bound on nominal interest rates remains an important issue. However, research on these issues is still developing, and no academic consensus has yet been reached. Given the various issues related to the impact of price fluctuations on social welfare, it is essential to deepen our understanding and continue to evaluate these issues from multiple perspectives.

Publications in the Broad-Perspective Review Series

Inokuma, Hiroshi, Mitsuru Katagiri, and Nao Sudo

(2024), "Innovation Choice, Product Life Cycles, and Optimal Trend Inflation," IMES Discussion Paper Series, No.2024-E-17, Institute for Monetary and Economic Studies, Bank of Japan.

Sugioka, Yu, Yuichiro Ito, Sohei Kaihatsu, and Kosuke Takatomi (2024), "Trends in the Discussions of the Costs and Benefits of Price Fluctuations," Bank of Japan Research Laboratory Series, No.24-E-2.

Experts' Commentaries[143]

Professor FUKUDA Shin-ichi, The University of Tokyo

Professor HOSHI Takeo, The University of Tokyo

Professor ITO Takatoshi, Columbia University

Professor MURATA Keiko, Rissho University

Professor SHIOJI Etsuro, Chuo University

Professor TSURU Kotaro, Keio University

Professor WATANABE Tsutomu, The University of Tokyo

Professor Emeritus YOSHIKAWA Hiroshi, The University of Tokyo

The English translation of "Experts' Commentaries" will be made available in this section in due course.

[143] Listed in alphabetical order of surname.

Publications in the Broad-Perspective Review Series

Real Economy

Bank of Japan (2024a), *Results of the Survey regarding Corporate Behavior since the Mid-1990s*, Regional Economic Report Annex.

Bank of Japan Research and Statistics Department (2024), "Summary of 10th Joint Conference: CARF and Bank of Japan Research and Statistics Department: 'Changes in the Global Economic Landscape and Japan's Economy,'" Bank of Japan Research Paper (in Japanese).

Fukunaga, Ichiro, Yoshihiko Hogen, Yojiro Ito, Kenji Kanai, and Satoshi Tsuchida (2024a), "Potential Growth in Japan: Issues on Its Relationship with Prices and Wages," Bank of Japan Working Paper Series, No.24-E-16.

Fukunaga, Ichiro, Yoshihiko Hogen, and Yoichi Ueno (2024), "Japan's Economy and Prices over the Past 25 Years: Past Discussions and Recent Issues," Bank of Japan Working Paper Series, No.24-E-14.

Hirakata, Naohisa and Mitsuru Katagiri (2024), "Role of Foreign Direct Investment as a Long-Term Capital Flow Channel," IMES Discussion Paper Series, No.2024-E-5, Institute for Monetary and Economic Studies, Bank of Japan.

Hogen, Yoshihiko, Yojiro Ito, Kenji Kanai, and Naoya Kishi (2024), "Changes in the Global Economic Landscape and Issues for Japan's Economy," Bank of Japan Working Paper Series, No.24-E-3.

Hogen, Yoshihiko and Naoya Kishi (2024), "On the Balassa-Samuelson Effect in Japan," Bank of Japan Working Paper Series, No.24-E-22.

Itai, Yusuke, Ryota Maeno, Akira Miyoshi, and Asuka Nishino (2024), "Environment for Startups in Japan and Initiatives in the Regional Japan," Bank of Japan Review Series, No.2024-E-5.

Katagiri, Mitsuru, Takemasa Oda, Yasutaka Ogawa, Takeshi Shinohara, and Nao Sudo (2024b), "Demographic Trends and Household Savings and Investment," Bank of Japan Research Laboratory Series, No.24-E-1.

Makabe, Yoshibumi and Tomoyuki Yagi (2024), "Firms' Interest Payment Burden and Productivity under a Low Interest Rate Environment," Bank of Japan Working Paper Series, No.24-E-20.

Oda, Takemasa (2024), "A Quantitative Assessment of the Impact of Deflation in an Aging Economy," IMES Discussion Paper Series, No.2024-E-14, Institute for Monetary and

Economic Studies, Bank of Japan.

Ogawa, Yasutaka and Jiro Yoshida (2024), "Aging, Housing, and Macroeconomic Inefficiency," IMES Discussion Paper Series, No.2024-E-4, Institute for Monetary and Economic Studies, Bank of Japan.

Shirota, Toyoichiro and Satoshi Tsuchida (2024), "Aggregate Implications of Changing Industrial Trends in Japan," Bank of Japan Working Paper Series, No.24-E-2.

Prices

Aoki, Kosuke, Yoshihiko Hogen, Yojiro Ito, Kenji Kanai, and Kosuke Takatomi (2024), "Determinants of Price Markups at Japanese Firms and Implications for Productivity," Bank of Japan Working Paper Series, No.24-E-15.

Fukunaga, Ichiro, Yosuke Kido, and Kotaro Suita (2024), "Japan's Inflation under Global Inflation Synchronization," Bank of Japan Working Paper Series, No.24-E-4.

Furukawa, Kakuho, Yoshihiko Hogen, Kazuki Otaka, and Nao Sudo (2024), "On the Zero-Inflation Norm of Japanese Firms," IMES Discussion Paper Series, No.2024-E-15, Institute for Monetary and Economic Studies, Bank of Japan.

Inokuma, Hiroshi, Mitsuru Katagiri, and Nao Sudo (2024), "Innovation Choice, Product Life Cycles, and Optimal Trend Inflation," IMES Discussion Paper Series, No.2024-E-17, Institute for Monetary and Economic Studies, Bank of Japan.

Kobayashi, Satoshi, Takeshi Shinohara, Shigenori Shiratsuka, Nao Sudo, and Itofumi Takeuchi (2024), "Measurement Errors in the Consumer Price Index: Perspectives on Numerical Targets for Price Stability in Major Economies," IMES Discussion Paper Series, No.2024-E-16, Institute for Monetary and Economic Studies, Bank of Japan.

Osada, Mitsuhiro and Takashi Nakazawa (2024), "Assessing Measures of Inflation Expectations: A Term Structure and Forecasting Power Perspective," Bank of Japan Review Series, No.2024-E-4.

Sugioka, Yu, Yuichiro Ito, Sohei Kaihatsu, and Kosuke Takatomi (2024), "Trends in the Discussions of the Costs and Benefits of Price Fluctuations," Bank of Japan Research Laboratory Series, No.24-E-2.

Ueno, Yoichi (2024), "Linkage between Wage and Price Inflation in Japan," Bank of Japan Working Paper Series, No-24-E-7.

Monetary Policy

Bank of Japan (2024b), "The Effects and Side Effects of Unconventional Monetary Policy: Summary of the First Workshop on the 'Review of Monetary Policy from a Broad Perspective,'" Bank of Japan Research Paper.

Bank of Japan (2024c), "Economic Activity, Prices, and Monetary Policy over the Past 25 Years: Summary of the Second Workshop on the 'Review of Monetary Policy from a Broad Perspective,'" Bank of Japan Research Paper.

Bank of Japan Monetary Affairs Department (2023), "Central Bank Finances and Monetary Policy Conduct," Bank of Japan Research Paper.

Fukunaga, Ichiro, Yui Kishaba, Nao Shibata, and Shunichi Yoneyama (2024b), "Uncertainty in the Formation of Inflation Expectations in Japan: An Analysis Using the Macroeconomic Model Q-JEM," mimeo.

Haba, Shunsuke, Yuichiro Ito, and Yoshiyasu Kasai (2024), "The Impact of Negative Interest Rate Policy on Interest Rate Formation and Lending," mimeo.

Haba, Shunsuke, Yuichiro Ito, Shogo Nakano, and Takahiro Yamanaka (2024a), "Assessing the Long-Term Impact of Monetary Policy," Bank of Japan Working Paper Series, No.24-E-19.

Haba, Shunsuke, Kimihiko Izawa, Yui Kishaba, Yusuke Takahashi, and Shunichi Yoneyama (2024b), "Measuring Policy Effects since the Introduction of Quantitative and Qualitative Monetary Easing (QQE): An Analysis Using the Macroeconomic Model Q-JEM," mimeo.

Hagio, Wataru, Daisuke Ikeda, Satoshi Kobayashi, and Nao Sudo (2024), "Price Dynamics and Monetary Policy Challenges -- Lessons Learned and Going Forward -- Summary of the 2024 BOJ-IMES Conference," IMES Discussion Paper Series, No.2024-E-11, Institute for Monetary and Economic Studies, Bank of Japan.

Hatayama, Yudai and Yuto Iwasaki (2024), "Estimating the Natural Yield Curve in Japan Using a VAR with Common Trends," Bank of Japan Working Paper Series, No.24-E-17.

Hatayama, Yudai, Yuto Iwasaki, Kyoko Nakagami, and Tatsuyoshi Okimoto (2024), "Globalization and Its Growing Impact on the Natural Rates of Interest in Developed Economies," Bank of Japan Working Paper Series, No.24-E-13.

Hirata, Atsuki, Yuichiro Ito, and Yoshiyasu Kasai (2024), "Impact of the Fund-Provisioning Measure to Stimulate Bank Lending in Japan," Bank of Japan Working Paper Series, No.24-E-24.

Hirata, Atsuki, Sohei Kaihatsu, Yoshiyasu Kasai, Hiroki Yamamoto, and Jouchi Nakajima (2024), "Effects and Side Effects of Unconventional Monetary Policy: A Shadow Rate Approach," Bank of Japan Working Paper Series, No.24-E-21.

Kaihatsu, Sohei, Shogo Nakano, and Hiroki Yamamoto (2024), "Macroeconomic Impact of Shifts in Long-term Inflation Expectations," Bank of Japan Working Paper Series, No.24-E-18.

Katagiri, Mitsuru, Yusuke Oh, Yasutaka Ogawa, Nao Sudo, and Takeki Sunakawa (2024a), "On the Interaction between Monetary and Fiscal Policy: Developments in Macroeconomics since the Global Financial Crisis," IMES Discussion Paper Series, No.2024-E-12, Institute for Monetary and Economic Studies, Bank of Japan.

Nakano, Shogo, Yu Sugioka, and Hiroki Yamamoto (2024), "Recent Developments in Measuring the Natural Rate of Interest," Bank of Japan Working Paper Series, No.24-E-12.

Nakazawa, Takashi and Mitsuhiro Osada (2024), "The Bank of Japan's Large-Scale Government Bond Purchases and the Formation of Long-Term Interest Rates," Bank of Japan Working Paper Series, No.24-E-10.

Financial Market

Bank of Japan Financial Markets Department (2024), "Developments in the Japanese Money Markets and their Functioning with Excess Reserves – Including Developments after the Termination of the Negative Interest Rate Policy –," Bank of Japan Research Paper.

Fukuma, Noritaka, Tomiyuki Kitamura, Kohei Maehashi, Naoki Matsuda, Keita Takemura, and Kota Watanabe (2024), "The Impact of Quantitative and Qualitative Easing and Yield Curve Control on the Functioning of the Japanese Government Bond Market," Bank of Japan Working Paper Series, No.24-E-9.

Ikkatai, Kota, Takuji Kawamoto, and Kenichi Sakura (2024), "Japan's Unconventional Monetary Policy and the Exchange Rate Dynamics," Bank of Japan Working Paper Series, No.24-E-23.

Ochi, Kaori and Mitsuhiro Osada (2024), "Market Functioning in the Japanese Corporate Bond Market," Bank of Japan Working Paper Series, No.24-E-5.

Financial System

Abe, Nobuhiro, Naohisa Hirakata, Yuto Ishikuro, Yosuke Koike, Yuki Konaka, and Yutaro Takano (2024), "Counterfactual Simulation of the Effect of Large-Scale Monetary Easing on Japan's Financial System," Bank of Japan Working Paper Series, No.24-E-8.

Bank of Japan Financial System and Bank Examination Department (2024), "The Effects of Monetary Easing on Japan's Financial System," Bank of Japan Research Paper.

References[144]

Abe, Nobuhiro, Kyosuke Chikamatsu, Kenji Kanai, Yusuke Kawasumi, Ko Munakata, Koki Nakayama, Tatsushi Okuda, and Yutaro Takano (2023), "The Financial Macro-econometric Model (FMM, 2022 Version)," Bank of Japan Research Paper.

Abe, Nobuhiro, Naohisa Hirakata, Yuto Ishikuro, Yosuke Koike, Yuki Konaka, and Yutaro Takano (2024), "Counterfactual Simulation of the Effect of Large-Scale Monetary Easing on Japan's Financial System," Bank of Japan Working Paper Series, No.24-E-8.

Adam, Klaus and Henning Weber (2019), "Optimal Trend Inflation," *American Economic Review*, Vol.109(2), pp.702-737.

Adam, Klaus and Henning Weber (2023), "Estimating the Optimal Inflation Target from Trends in Relative Prices," *American Economic Journal: Macroeconomics*, Vol.15(3), pp.1-42.

Adolfsen, Jakob F. and Morten Spange (2020), "Modest Pass-Through of Monetary Policy to Retail Rates but No Reversal," Danmarks Nationalbank Working Paper, No.154.

Albuquerque, Bruno and Roshan Iyer (2023), "The Rise of the Walking Dead: Zombie Firms around the World," IMF Working Papers, No.2023/125.

Altavilla, Carlo, Luca Brugnolini, Refet S. Gürkaynak, Roberto Motto, and Giuseppe Ragusa (2019), "Measuring Euro Area Monetary Policy," *Journal of Monetary Economics*, Vol.108, pp.162-179.

Aoki, Kosuke, Yoshihiko Hogen, Yojiro Ito, Kenji Kanai, and Kosuke Takatomi (2024), "Determinants of Price Markups at Japanese Firms and Implications for Productivity," Bank of Japan Working Paper Series, No.24-E-15.

Aoki, Kosuke, Yoshihiko Hogen, and Kosuke Takatomi (2023), "Price Markups and Wage Setting Behavior of Japanese Firms," Bank of Japan Working Paper Series, No.23-E-5.

Aoki, Kosuke, Hibiki Ichiue, and Tatsushi Okuda (2019), "Consumers' Price Beliefs, Central Bank Communication, and Inflation Dynamics," Bank of Japan Working Paper Series, No.19-E-14.

Atkinson, David (2020), *Opportunities for Success for Japanese Companies: Securing Human Resources x Productivity x Corporate Growth*, Toyo Keizai (in Japanese).

[144] When references are cited in the text, all authors' names are listed for references with three or fewer authors (e.g., Aoki, Hogen, and Takatomi (2023)), while those with four or more authors are shortened (e.g., Aoki et al. (2024)).

Ball, Laurence M., Daniel Leigh, and Prachi Mishra (2022), "Understanding U.S. Inflation during the COVID Era," IMF Working Papers, No.2022/208.

Banerjee, Ryan N. and Boris Hofmann (2018), "The Rise of Zombie Firms: Causes and Consequences," BIS Quarterly Review, September 2018, pp.67-78.

Bank of Japan (2016), *Comprehensive Assessment: Developments in Economic Activity and Prices as well as Policy Effects since the Introduction of Quantitative and Qualitative Monetary Easing (QQE).*

Bank of Japan (2021), *Assessment for Further Effective and Sustainable Monetary Easing.*

Bank of Japan (2024a), *Results of the Survey regarding Corporate Behavior since the Mid-1990s*, Regional Economic Report Annex.

Bank of Japan (2024b), "The Effects and Side Effects of Unconventional Monetary Policy: Summary of the First Workshop on the 'Review of Monetary Policy from a Broad Perspective,'" Bank of Japan Research Paper.

Bank of Japan (2024c), "Economic Activity, Prices, and Monetary Policy over the Past 25 Years: Summary of the Second Workshop on the 'Review of Monetary Policy from a Broad Perspective,'" Bank of Japan Research Paper.

Bank of Japan (2024d), *Outlook for Economic Activity and Prices*, April 2024.

Bank of Japan (2024e), *Financial System Report*, October 2024.

Bank of Japan Financial Markets Department (2024), "Developments in the Japanese Money Markets and their Functioning with Excess Reserves – Including Developments after the Termination of the Negative Interest Rate Policy –," Bank of Japan Research Paper.

Bank of Japan Financial System and Bank Examination Department (2024), "The Effects of Monetary Easing on Japan's Financial System," Bank of Japan Research Paper.

Bank of Japan Monetary Affairs Department (2022), "Characteristics of Price Developments in Japan: Summary of the First Workshop on 'Issues Surrounding Price Developments during the COVID-19 Pandemic,'" Bank of Japan Research Paper.

Bank of Japan Monetary Affairs Department (2023), "Central Bank Finances and Monetary Policy Conduct," Bank of Japan Research Paper.

Bank of Japan Monetary Affairs Department and Research and Statistics Department (2023), "The Wage Formation Mechanism in Japan: Summary of the Third Workshop on 'Issues

Surrounding Price Developments during the COVID-19 Pandemic,'" Bank of Japan Research Paper.

Bank of Japan Research and Statistics Department (2022), "The Phillips Curve and Cost Pass-Through in Japan: Summary of the Second Workshop on 'Issues Surrounding Price Developments during the COVID-19 Pandemic,'" Bank of Japan Research Paper.

Bank of Japan Research and Statistics Department (2024), "Summary of 10th Joint Conference: CARF and Bank of Japan Research and Statistics Department: 'Changes in the Global Economic Landscape and Japan's Economy,'" Bank of Japan Research Paper (in Japanese).

Baqaee, David R., Emmanuel Farhi, and Kunal Sangani (2024), "The Supply-Side Effects of Monetary Policy," *Journal of Political Economy*, Vol.132(4), pp.1065-1112.

Barbon, Andrea and Virginia Gianinazzi (2019), "Quantitative Easing and Equity Prices: Evidence from the ETF Program of the Bank of Japan," *The Review of Asset Pricing Studies*, Vol.9(2), pp.210-255.

Barsky, Robert, Alejandro Justiniano, and Leonardo Melosi (2014), "The Natural Rate of Interest and Its Usefulness for Monetary Policy," *American Economic Review*, Vol.104(5), pp.37-43.

Bauer, Michael D. and Glenn D. Rudebusch (2020), "Interest Rates under Falling Stars," *American Economic Review*, Vol.110(5), pp.1316-1354.

Bergeaud, Antonin, Gilbert Cette, and Rémy Lecat (2016), "Productivity Trends in Advanced Countries between 1890 and 2012," *Review of Income and Wealth*, Vol.62(3), pp.420–444.

Bernanke, Ben S. (2000), "Japanese Monetary Policy: A Case of Self-Induced Paralysis?" in *Japan's Financial Crisis and Its Parallels to U.S. Experience*, edited by Ryoichi Mikitani and Adam S. Posen, Peterson Institute for International Economics.

Bernanke, Ben S. (2005), "The Global Saving Glut and the U.S. Current Account Deficit," Remarks at the Sandridge Lecture, Virginia Association of Economists, Richmond, Virginia.

Bernanke, Ben S. (2020), "The New Tools of Monetary Policy," *American Economic Review*, Vol.110(4), pp.943-983.

Bernanke, Ben S. (2022), *21st Century Monetary Policy: The Federal Reserve from the Great*

Inflation to COVID-19, W. W. Norton and Company.

Bernanke, Ben S. and Olivier J. Blanchard (2024a), "What Caused the U.S. Pandemic-Era Inflation?" *American Economic Journal: Macroeconomics*, forthcoming.

Bernanke, Ben S. and Olivier J. Blanchard (2024b), "Analysing the Inflation Burst in Eleven Economies," in *Monetary Policy Responses to the Post-Pandemic Inflation*, edited by Bill English, Kristin Forbes, and Ángel Ubide, CEPR Press.

Bowman, David, Fang Cai, Sally Davies, and Steven Kamin (2015), "Quantitative Easing and Bank Lending: Evidence from Japan," *Journal of International Money and Finance*, Vol.57, pp.15-30.

Brand, Claus and Falk Mazelis (2019), "Taylor-Rule Consistent Estimates of the Natural Rate of Interest," ECB Working Paper Series, No.2257.

Coibion, Olivier, Yuriy Gorodnichenko, and Johannes Wieland (2012), "The Optimal Inflation Rate in New Keynesian Models: Should Central Banks Raise Their Inflation Targets in Light of the Zero Lower Bound?" *The Review of Economic Studies*, Vol.79(4), pp.1371-1406.

Daly, Mary C. and Bart Hobijn (2014), "Downward Nominal Wage Rigidities Bend the Phillips Curve," *Journal of Money, Credit and Banking,* Vol.46(S2), pp.51-93.

Date, Daiki, Takushi Kurozumi, Takashi Nakazawa, and Yu Sugioka (2024), "Heterogeneity and Wage Growth of Full-Time Workers in Japan: An Empirical Analysis Using Micro Data," *Journal of the Japanese and International Economies*, Vol.73, Article 101324.

Del Negro, Marco, Domenico Giannone, Marc P. Giannoni, and Andrea Tambalotti (2017), "Safety, Liquidity, and the Natural Rate of Interest," *Brookings Papers on Economic Activity*, Spring 2017, pp.235-316.

Diegel, Max and Dieter Nautz (2021), "Long-Term Inflation Expectations and the Transmission of Monetary Policy Shocks: Evidence from a SVAR Analysis," *Journal of Economic Dynamics and Control*, Vol.130, 104192.

Economic Planning Agency (1989), *Price Report 1989*, Economic Planning Association (in Japanese).

Economic Planning Agency (1995), *Price Report 1995*, Economic Planning Association (in Japanese).

Economic Planning Agency (1996), *Price Report 1996*, Economic Planning Association (in

Japanese).

Eisenschmidt, Jens and Frank Smets (2019), "Negative Interest Rates: Lessons from the Euro Area," in *Monetary Policy and Financial Stability: Transmission Mechanisms and Policy Implications*, Vol.26, pp.13-42, Central Bank of Chile.

Feldstein, Martin S. (1999), "Capital Income Taxes and the Benefit of Price Stability," *The Costs and Benefits of Price Stability*, edited by Martin S. Feldstein, The University of Chicago Press.

Ferreira, Thiago R.T. and Samer Shousha (2023), "Determinants of Global Neutral Interest Rates," *Journal of International Economics*, Vol.145, 103833.

Fisher, Irving (1928), *The Money Illusion*, Adelphi Company.

Fisher, Irving (1933), "The Debt-Deflation Theory of Great Depressions," *Econometrica*, Vol.1(4), pp.337-357.

Forbes, Kristin J. (2019), "Inflation Dynamics: Dead, Dormant, or Determined Abroad?" *Brookings Papers on Economic Activity*, Fall 2019, pp.257-319.

Friedman, Milton (1969), *The Optimum Quantity of Money and Other Essays*, Aldine Publishing Company.

Fukuma, Noritaka, Tomiyuki Kitamura, Kohei Maehashi, Naoki Matsuda, Keita Takemura, and Kota Watanabe (2024), "The Impact of Quantitative and Qualitative Easing and Yield Curve Control on the Functioning of the Japanese Government Bond Market," Bank of Japan Working Paper Series, No.24-E-9.

Fukunaga, Ichiro, Yoshihiko Hogen, Yojiro Ito, Kenji Kanai, and Satoshi Tsuchida (2024a), "Potential Growth in Japan: Issues on Its Relationship with Prices and Wages," Bank of Japan Working Paper Series, No.24-E-16.

Fukunaga, Ichiro, Yoshihiko Hogen, and Yoichi Ueno (2024), "Japan's Economy and Prices over the Past 25 Years: Past Discussions and Recent Issues," Bank of Japan Working Paper Series, No.24-E-14.

Fukunaga, Ichiro, Yosuke Kido, and Kotaro Suita (2024), "Japan's Inflation under Global Inflation Synchronization," Bank of Japan Working Paper Series, No.24-E-4.

Fukunaga, Ichiro, Yui Kishaba, Nao Shibata, and Shunichi Yoneyama (2024b), "Uncertainty in the Formation of Inflation Expectations in Japan: An Analysis Using the Macroeconomic Model Q-JEM," mimeo.

Furukawa, Kakuho, Yoshihiko Hogen, Kazuki Otaka, and Nao Sudo (2024), "On the Zero-Inflation Norm of Japanese Firms," IMES Discussion Paper Series, No.2024-E-15, Institute for Monetary and Economic Studies, Bank of Japan.

Genda, Yuji (2017), *Why Are Wages Not Rising despite the Labor Shortage?* Keio University Press (in Japanese).

Goy, Gavin and Yuto Iwasaki (2024), "From the Natural Rate towards a Natural Curve: A First Step to Benchmarking the Term Structure," mimeo.

Grisse, Christian, Signe Krogstrup, and Silvio Schumacher (2017), "Lower-Bound Beliefs and Long-Term Interest Rates," *International Journal of Central Banking*, Vol.13(3), pp.165-202.

Guerron-Quintana, Pablo A., Tomohiro Hirano, and Ryo Jinnai (2023), "Bubbles, Crashes, and Economic Growth: Theory and Evidence," *American Economic Journal: Macroeconomics*, Vol.15(2), pp.333-371.

Haba, Shunsuke, Yuichiro Ito, and Yoshiyasu Kasai (2024), "The Impact of Negative Interest Rate Policy on Interest Rate Formation and Lending," mimeo.

Haba, Shunsuke, Yuichiro Ito, Shogo Nakano, and Takahiro Yamanaka (2024a), "Assessing the Long-Term Impact of Monetary Policy," Bank of Japan Working Paper Series, No.24-E-19.

Haba, Shunsuke, Kimihiko Izawa, Yui Kishaba, Yusuke Takahashi, and Shunichi Yoneyama (2024b), "Measuring Policy Effects since the Introduction of Quantitative and Qualitative Monetary Easing (QQE): An Analysis Using the Macroeconomic Model Q-JEM," mimeo.

Hagio, Wataru, Daisuke Ikeda, Satoshi Kobayashi, and Nao Sudo (2024), "Price Dynamics and Monetary Policy Challenges – -- Lessons Learned and Going Forward -- Summary of the 2024 BOJ-IMES Conference," IMES Discussion Paper Series, No.2024-E-11, Institute for Monetary and Economic Studies, Bank of Japan.

Hatayama, Yudai and Yuto Iwasaki (2024), "Estimating the Natural Yield Curve in Japan Using a VAR with Common Trends," Bank of Japan Working Paper Series, No.24-E-17.

Hatayama, Yudai, Yuto Iwasaki, Kyoko Nakagami, and Tatsuyoshi Okimoto (2024), "Globalization and Its Growing Impact on the Natural Rates of Interest in Developed Economies," Bank of Japan Working Paper Series, No.24-E-13.

Hattori, Takahiro and Jiro Yoshida (2023), "Yield Curve Control," *International Journal of*

Central Banking, Vol.19(5), pp.403-438.

Hawtrey, Ralph G. (1938), *A Century of Bank Rate*, Longmans, Green and Company.

Hirakata, Naohisa, Kazutoshi Kan, Akihiro Kanafuji, Yosuke Kido, Yui Kishaba, Tomonori Murakoshi, and Takeshi Shinohara (2019), "The Quarterly Japanese Economic Model (Q-JEM): 2019 Version," Bank of Japan Working Paper Series, No.19-E-7.

Hirakata, Naohisa and Mitsuru Katagiri (2024), "Role of Foreign Direct Investment as a Long-Term Capital Flow Channel," IMES Discussion Paper Series, No.2024-E-5, Institute for Monetary and Economic Studies, Bank of Japan.

Hirata, Atsuki, Yuichiro Ito, and Yoshiyasu Kasai (2024), "Impact of the Fund-Provisioning Measure to Stimulate Bank Lending in Japan," Bank of Japan Working Paper Series, No.24-E-24.

Hirata, Atsuki, Sohei Kaihatsu, Yoshiyasu Kasai, Hiroki Yamamoto, and Jouchi Nakajima (2024), "Effects and Side Effects of Unconventional Monetary Policy: A Shadow Rate Approach," Bank of Japan Working Paper Series, No.24-E-21.

Hirata, Wataru, Toshitaka Maruyama, and Tomohide Mineyama (2020), "Flattening of the Wage Phillips Curve and Downward Nominal Wage Rigidity: The Japanese Experience in the 2010s," Bank of Japan Working Paper Series, No.20-E-4.

Hirose, Yasuo and Shinsuke Ohyama (2010), "Identifying the Effect of the Bank of Japan's Liquidity Facilities: The Case of Commercial Paper Operations during the Financial Turmoil," *International Finance*, Vol.13(3), pp.461-483.

Hogen, Yoshihiko, Yojiro Ito, Kenji Kanai, and Naoya Kishi (2024), "Changes in the Global Economic Landscape and Issues for Japan's Economy," Bank of Japan Working Paper Series, No.24-E-3.

Hogen, Yoshihiko and Naoya Kishi (2024), "On the Balassa-Samuelson Effect in Japan," Bank of Japan Working Paper Series, No.24-E-22.

Holston, Kathryn, Thomas Laubach, and John C. Williams (2023), "Measuring the Natural Rate of Interest after COVID-19," Federal Reserve Bank of New York Staff Report, No.1063.

Ichiue, Hibiki (2024), "The Bank of Japan's Stock Holdings and Long-term Returns," Working Papers on Central Bank Communication Design, No.049, Graduate School of Economics, University of Tokyo.

Ikeda, Shuichiro, Ushio Kawano, Yoshibumi Makabe, Kohei Takata, and Tomoyuki Yagi (2024), "Effects of Demographic Changes on Labor Market and Wage Developments," mimeo.

Ikeda, Shuichiro, Takuji Kondo, Yoshiyuki Kurachi, Taichi Matsuda, and Tomoyuki Yagi (2023), "Firms' Recent Price-Setting Stance: Evidence from the *Tankan*," Bank of Japan Review Series, No.2023-E-2.

Ikkatai, Kota, Takuji Kawamoto, and Kenichi Sakura (2024), "Japan's Unconventional Monetary Policy and the Exchange Rate Dynamics," Bank of Japan Working Paper Series, No.24-E-23.

Imakubo, Kei, Haruki Kojima, and Jouchi Nakajima (2015), "The Natural Yield Curve: Its Concept and Measurement," Bank of Japan Working Paper Series, No.15-E-5.

Imakubo, Kei and Jouchi Nakajima (2015), "Estimating Inflation Risk Premia from Nominal and Real Yield Curves Using a Shadow-Rate Model," Bank of Japan Working Paper Series, No.15-E-1.

Inokuma, Hiroshi, Mitsuru Katagiri, and Nao Sudo (2024), "Innovation Choice, Product Life Cycles, and Optimal Trend Inflation," IMES Discussion Paper Series, No.2024-E-17, Institute for Monetary and Economic Studies, Bank of Japan.

Itai, Yusuke, Ryota Maeno, Akira Miyoshi, and Asuka Nishino (2024), "Environment for Startups in Japan and Initiatives in the Regional Japan," Bank of Japan Review Series, No.2024-E-5.

Itoh, Motoshige (2024), "Downward Rigidity: A Barrier to Corporate Dynamism," *Nikkei Veritas* (February 25, 2024), Nikkei Inc. (in Japanese).

Kaihatsu, Sohei, Shogo Nakano, and Hiroki Yamamoto (2024), "Macroeconomic Impact of Shifts in Long-term Inflation Expectations," Bank of Japan Working Paper Series, No.24-E-18.

Katagiri, Mitsuru, Yusuke Oh, Yasutaka Ogawa, Nao Sudo, and Takeki Sunakawa (2024a), "On the Interaction between Monetary and Fiscal Policy: Developments in Macroeconomics since the Global Financial Crisis," IMES Discussion Paper Series, No.2024-E-12, Institute for Monetary and Economic Studies, Bank of Japan.

Katagiri, Mitsuru, Takemasa Oda, Yasutaka Ogawa, Takeshi Shinohara, and Nao Sudo (2024b), "Demographic Trends and Household Savings and Investment," Bank of Japan Research Laboratory Series, No.24-E-1.

Kawamoto, Takuji, Takashi Nakazawa, Yui Kishaba, Kohei Matsumura, and Jouchi Nakajima (2021), "Estimating Effects of Expansionary Monetary Policy since the Introduction of Quantitative and Qualitative Monetary Easing (QQE) Using the Macroeconomic Model (Q-JEM)," Bank of Japan Working Paper Series, No.21-E-4.

Kiley, Michael T. (2020), "The Global Equilibrium Real Interest Rate: Concepts, Estimates, and Challenges," *Annual Review of Financial Economics*, Vol.12, pp.305-326.

Kim, Don, Cait Walsh, and Min Wei (2019), "Tips from TIPS: Update and Discussions," FEDS Notes, May 21, 2019.

Kim, Jinill and Francisco J. Ruge-Murcia (2009), "How Much Inflation is Necessary to Grease the Wheels?" *Journal of Monetary Economics*, Vol.56(3), pp.365-377.

King, Robert G. and Alexander L. Wolman (1999), "What Should the Monetary Authority Do When Prices are Sticky?" *Monetary Policy Rules*, edited by John B. Taylor, The University of Chicago Press, pp.349-404.

Kobayashi, Satoshi, Takeshi Shinohara, Shigenori Shiratsuka, Nao Sudo, and Itofumi Takeuchi (2024), "Measurement Errors in the Consumer Price Index: Perspectives on Numerical Targets for Price Stability in Major Economies," IMES Discussion Paper Series, No.2024-E-16, Institute for Monetary and Economic Studies, Bank of Japan.

Koga, Maiko, Koichi Yoshino, and Tomoya Sakata (2019), "Strategic Complementarity and Asymmetric Price Setting among Firms," Bank of Japan Working Paper Series, No.19-E-5.

Krippner, Leo (2015), *Zero Lower Bound Term Structure Modeling: A Practitioners Guide*, Palgrave Macmillan.

Krippner, Leo (2022), "Unwind of Negative Bond Risk Premium to Underpin Rising Yields," mimeo.

Krugman, Paul R. (1998), "It's Baaack: Japan's Slump and the Return of the Liquidity Trap," *Brookings Papers on Economic Activity*, No.2, pp.137-205.

Kubota, Hiroyuki and Mototsugu Shintani (2022), "High-Frequency Identification of Monetary Policy Shocks in Japan," *The Japanese Economic Review*, Vol.73, pp.483-513.

Kurosaki, Tetsuo, Yusuke Kumano, Kota Okabe, and Teppei Nagano (2015), "Liquidity in JGB Markets: An Evaluation from Transaction Data," Bank of Japan Working Paper Series, No.15-E-2.

Lane, Philip R. (2019), "The Yield Curve and Monetary Policy," Public Lecture for the Centre for Finance and the Department of Economics at University College London.

Levy, Daniel, Mark Bergen, Shantanu Dutta, and Robert Venable (1997), "The Magnitude of Menu Costs: Direct Evidence from Large U.S. Supermarket Chains," *The Quarterly Journal of Economics*, Vol.112(3), pp.791-825.

Ma, Yueran and Kaspar Zimmermann (2023), "Monetary Policy and Innovation," University of Chicago, Becker Friedman Institute for Economics Working Paper, No.2023-125.

Makabe, Yoshibumi and Tomoyuki Yagi (2024), "Firms' Interest Payment Burden and Productivity under a Low Interest Rate Environment," Bank of Japan Working Paper Series, No.24-E-20.

Mishkin, Frederic S. (2004), "Can Central Bank Transparency Go Too Far?" NBER Working Paper Series, No.10829.

Morikawa, Masayuki (2021), "Productivity of Firms Using Relief Policies during the COVID-19 Crisis," *Economics Letters*, Vol.203, 109869.

Nakajima, Jouchi (2023), "Estimation of Firms' Inflation Expectations Using the Survey DI," Discussion Paper Series A, No.749, Institute of Economic Research, Hitotsubashi University.

Nakajima, Jouchi, Nao Sudo, Yoshihiko Hogen, and Yasutaka Takizuka (2023), "On the Estimation of the Natural Yield Curve," Discussion Paper Series A, No.753, Institute of Economic Research, Hitotsubashi University.

Nakamura, Koji, Sohei Kaihatsu, and Tomoyuki Yagi (2019), "Productivity Improvement and Economic Growth: Lessons from Japan," *Economic Analysis and Policy*, Vol.62, pp.57-79.

Nakamura, Koji, Shogo Nakano, Mitsuhiro Osada, and Hiroki Yamamoto (2024), "What Caused the Pandemic-Era Inflation?: Application of the Bernanke-Blanchard Model to Japan," Bank of Japan Working Paper Series, No.24-E-1.

Nakano, Shogo, Yu Sugioka, and Hiroki Yamamoto (2024), "Recent Developments in Measuring the Natural Rate of Interest," Bank of Japan Working Paper Series, No.24-E-12.

Nakazawa, Takashi and Mitsuhiro Osada (2024), "The Bank of Japan's Large-Scale Government Bond Purchases and the Formation of Long-Term Interest Rates," Bank of

Japan Working Paper Series, No.24-E-10.

Nishizaki, Kenji, Akira Tsuchikawa, and Tomoyuki Yagi (2013), "Indicators Related to Liquidity in JGB Markets," Bank of Japan Review Series, No.2013-E-3.

Obstfeld, Maurice (2023), "Natural and Neutral Real Interest Rates: Past and Future," NBER Working Paper Series, No.31949.

Ochi, Kaori and Mitsuhiro Osada (2023), "Developments in Corporate Bond Spreads at Issuance," Bank of Japan Review Series, No.2023-E-8.

Ochi, Kaori and Mitsuhiro Osada (2024), "Market Functioning in the Japanese Corporate Bond Market," Bank of Japan Working Paper Series, No.24-E-5.

Oda, Takemasa (2024), "A Quantitative Assessment of the Impact of Deflation in an Aging Economy," IMES Discussion Paper Series, No.2024-E-14, Institute for Monetary and Economic Studies, Bank of Japan.

Ogawa, Yasutaka and Jiro Yoshida (2024), "Aging, Housing, and Macroeconomic Inefficiency," IMES Discussion Paper Series, No.2024-E-4, Institute for Monetary and Economic Studies, Bank of Japan.

Okazaki, Yosuke and Nao Sudo (2018), "Natural Rate of Interest in Japan – Measuring Its Size and Identifying Drivers Based on a DSGE Model –," Bank of Japan Working Paper Series, No.18-E-6.

Orphanides, Athanasios (2023), "The Forward Guidance Trap," IMES Discussion Paper Series, No.2023-E-6, Institute for Monetary and Economic Studies, Bank of Japan.

Osada, Mitsuhiro and Takashi Nakazawa (2024), "Assessing Measures of Inflation Expectations: A Term Structure and Forecasting Power Perspective," Bank of Japan Review Series, No.2024-E-4.

Ozaki, Tatsuya, Masahiro Jimbo, Tomoyuki Yagi, and Akihito Yoshii (2024), "Recent Developments in the Linkage between Wages and Prices," Bank of Japan Review Series, No.2024-E-2.

Ozaki, Tatsuya, Tomoyuki Yagi, and Akihito Yoshii (2024), "Firms' Recent Price-Setting Behavior for Services Prices in the Consumer Prices," Bank of Japan Review Series, No.2024-E-10.

Pelizzon, Loriana, Marti G. Subrahmanyam, Reiko Tobe, and Jun Uno (2018), "Scarcity and Spotlight Effects on Liquidity and Yield: Quantitative Easing in Japan," IMES Discussion

Paper Series, No.2018-E-14, Institute for Monetary and Economic Studies, Bank of Japan.

Pissarides, Christopher A. (1992), "Loss of Skill during Unemployment and the Persistence of Employment Shocks," *The Quarterly Journal of Economics,* Vol.107(4), pp.1371-1391.

Rostagno, Massimo, Carlo Altavilla, Giacomo Carboni, Wolfgang Lemke, Roberto Motto, Arthur S. Guilhem, and Jonathan Yiangou (2019), "A Tale of Two Decades: the ECB's Monetary Policy at 20," ECB Working Paper Series, No.2346.

Schnabel, Isabel (2024), "The Benefits and Costs of Asset Purchases," Speech at the 2024 BOJ-IMES Conference.

Shintani, Kohei, Yoshiyuki Kurachi, Shinichi Nishioka, and Takashi Okamoto (2016), "Administered Prices in Japan: Institutional Comparisons with Europe and the United States," Bank of Japan Review Series, No.2016-E-9.

Shioji, Etsuro (2019), "Quantitative 'Flooding' and Bank Lending: Evidence from 18 Years of Near-Zero Interest Rate," *Journal of the Japanese and International Economies*, Vol.52, pp.107-120.

Shirota, Toyoichiro and Satoshi Tsuchida (2024), "Aggregate Implications of Changing Industrial Trends in Japan," Bank of Japan Working Paper Series, No.24-E-2.

Sims, Christopher A. (2004), "Limits to Inflation Targeting," in *The Inflation-Targeting Debate*, edited by Ben S. Bernanke and Michael Woodford, The University of Chicago Press, pp.283-308.

Stadler, George W. (1990), "Business Cycle Models with Endogenous Technology," *American Economic Review*, Vol.80(4), pp.763-778.

Sudo, Nao and Masaki Tanaka (2021), "Quantifying Stock and Flow Effects of QE," *Journal of Money, Credit and Banking*, Vol.53(7), pp.1719-1755.

Suganuma, Kenji and Yoichi Ueno (2018), "The Effects of the Bank of Japan's Corporate and Government Bond Purchases on Credit Spreads," IMES Discussion Paper Series, No.2018-E-4, Institute for Monetary and Economic Studies, Bank of Japan.

Sugioka, Yu, Yuichiro Ito, Sohei Kaihatsu, and Kosuke Takatomi (2024), "Trends in the Discussions of the Costs and Benefits of Price Fluctuations," Bank of Japan Research Laboratory Series, No.24-E-2.

Tobin, James (1965), "Money and Economic Growth," *Econometrica*, Vol.33(4), pp.671-684.

Tobin, James (1972), "Inflation and Unemployment," *American Economic Review*, Vol.62(1), pp.1-18.

Ueno, Yoichi (2024), "Linkage between Wage and Price Inflation in Japan," Bank of Japan Working Paper Series, No.24-E-7.

Ugai, Hiroshi (2007), "Effects of the Quantitative Easing Policy: A Survey of Empirical Analyses," *Monetary and Economic Studies*, Vol.25(1), pp.1-48.

Watanabe, Tsutomu (2022), *What Are Prices?* Kodansha Ltd. (in Japanese).

Watanabe, Tsutomu (2023), *Current Situation and Future Outlook of the "Virtuous Cycle between Wages and Prices*," Handout at the 17th Meeting of the Council on Economic and Fiscal Policy (December 21, 2023, in Japanese).

Watanabe, Tsutomu (2024), *Thinking about Prices: The Mystery of Deflation and Inflation,* Nikkei Publishing (in Japanese).

Williams, John C. (2016), "Monetary Policy in a Low R-star World," *Economic Letter*, No.2016-23, Federal Reserve Bank of San Francisco.

Woodford, Michael (2013), "Forward Guidance by Inflation-Targeting Central Banks," Department of Economics Discussion Paper Series, No.1314-15, Columbia University.

Wu, Jing C. and Fan D. Xia (2016), "Measuring the Macroeconomic Impact of Monetary Policy at the Zero Lower Bound," *Journal of Money, Credit and Banking*, Vol.48(2-3), pp.253-291.

Yagi, Tomoyuki, Kakuho Furukawa, and Jouchi Nakajima (2022), "Productivity Trends in Japan -- Reviewing Recent Facts and the Prospects for the Post-COVID-19 Era --," Bank of Japan Working Paper Series, No.22-E-10.

Yamada, Kotone, Yukio Minoura, Jouchi Nakajima, and Tomoyuki Yagi (2023), "Corporate Finance Facility and Resource Allocation: Research Trends and Developments during the Spread of COVID-19," Bank of Japan Working Paper Series, No.23-E-1.

Yellen, Janet L. (2016), "Macroeconomic Research after the Crisis," Speech at the 60th Annual Economic Conference Sponsored by the Federal Reserve Bank of Boston.

Yoshikawa, Hiroshi (2022), *Reconstruction of Macroeconomics: Methods of Statistical Physics, and Keynes' Principle of Effective Demand*, Springer.

Summary of Changes in Monetary Policy Management

Feb. 1999	Introduction of the Zero Interest Rate Policy ➢ The Bank of Japan will provide more ample funds and encourage the uncollateralized overnight call rate to move as low as possible.
Aug. 2000	Termination of the Zero Interest Rate Policy ➢ The Bank of Japan will encourage the uncollateralized overnight call rate to move on average around 0.25%.
Oct. 2000	Release of "On Price Stability"
Feb. 2001	Change in the Guideline of Money Market Operations ➢ Encourage the uncollateralized overnight call rate to move on average around 0.15 percent. The Establishment of Complementary Lending Facility
Mar. 2001	Introduction of the Quantitative Easing Policy ➢ The Bank of Japan will conduct money market operations, aiming the outstanding balance of the current accounts at the Bank at around 5 trillion yen. Should there be a risk of financial market instability, e.g., a rapid surge in liquidity demand, the Bank will provide ampler liquidity irrespective of the guideline above. ➢ Strong Commitment in terms of Policy Duration
June 2003	Introduction of Purchases of Asset-Backed Securities
Apr. 2004	Introduction of the Securities Lending Facility to Provide the Markets with a Secondary Source of Japanese Government Securities
Mar. 2006	Termination of the Quantitative Easing Policy ➢ The Bank of Japan will encourage the uncollateralized overnight call rate to remain at effectively zero percent. Release of "The Bank's Thinking on Price Stability" ➢ An approximate range between zero and two percent of year-on-year change in the consumer price index was generally consistent with the distribution of each Board member's understanding of medium- to long-term price stability (median figures fell on both sides of one percent).
July 2006	Change in the Guideline of Money Market Operations ➢ The Bank of Japan will encourage the uncollateralized overnight call rate to remain at around 0.25 percent.
Feb. 2007	Change in the Guideline of Money Market Operations ➢ The Bank of Japan will encourage the uncollateralized overnight call rate to remain at around 0.5 percent.
Sept. 2008	The Bank of Japan, the European Central Bank, the Bank of England, the Bank of Canada, and the Swiss National Bank have established the temporary U.S. dollar swap agreements

	with the Federal Reserve respectively. The Bank of Japan has introduced the scheme supplying U.S. dollars within the value of collateral on a fixed interest rate basis (U.S. Dollar Funds-Supplying Operations against Pooled Collateral).
Oct. 2008	Change in the Guideline of Money Market Operations ➢ The Bank of Japan will encourage the uncollateralized overnight call rate to be at around 0.3 percent. Introduction of Complementary Deposit Facility Increasing the frequency and the size of CP repo operations
Dec. 2008	Change in the Guideline of Money Market Operations ➢ The Bank of Japan will encourage the uncollateralized overnight call rate to be at around 0.1 percent. Introduction of the Special Funds-Supplying Operations to Facilitate Corporate Financing
Jan. 2009	Introduction of Outright Purchases of CP
Feb. 2009	Introduction of Outright Purchases of corporate bonds
Dec. 2009	Release of "Clarification of the Understanding of Medium- to Long-Term Price Stability" ➢ The Policy Board does not tolerate a year-on-year rate of change in the CPI equal to or below 0 percent. The midpoints of most Policy Board members' "understanding" are around 1 percent.
May 2010	The Bank of Japan, the European Central Bank, the Bank of England, the Bank of Canada, and the Swiss National Bank have re-established the temporary U.S. dollar swap agreements with the Federal Reserve respectively. The Bank of Japan has restarted the U.S. Dollar Funds-Supplying Operations against Pooled Collateral.
June 2010	Introduction of the Fund-Provisioning Measure to Support Strengthening the Foundations for Economic Growth ➢ The fund-provisioning measure supplies long-term funds at a low interest rate to financial institutions in accordance with their efforts in terms of lending and investment toward strengthening the foundations for economic growth.
Oct. 2010	Introduction of Comprehensive Monetary Easing ➢ The Bank of Japan will encourage the uncollateralized overnight call rate to remain at around 0 to 0.1 percent. ➢ Clarification of policy time horizon ➢ Establishment of an Asset Purchase Program ・ The Bank will examine establishing, as a temporary measure, a program on its balance sheet to purchase various financial assets, such as government securities, commercial paper (CP), corporate bonds, exchange-traded funds (ETFs), and Japan real estate investment trusts (J-REITs) and to conduct the fixed-rate funds-supplying operation against the pooled collateral.
Apr. 2011	Introduction of the Funds-Supplying Operation to Support Financial Institutions in Disaster Areas

Nov. 2011	The Bank of Japan, the Federal Reserve, the European Central Bank, the Bank of England, the Bank of Canada, and the Swiss National Bank have agreed to establish temporary bilateral liquidity swap arrangements so that liquidity can be provided in each jurisdiction in any of their currencies.
Feb. 2012	Release of "The Price Stability Goal in the Medium to Long Term" ➢ The Bank judges that "the price stability goal in the medium to long term" is in a positive range of 2 percent or lower in terms of the year-on-year rate of change in the consumer price index (CPI) and, more specifically, set a goal at 1 percent for the time being.
Oct. 2012	Release of "Measures Aimed at Overcoming Deflation"
Dec. 2012	Introduction of the Stimulating Bank Lending Facility ➢ The Stimulating Bank Lending Facility aims to provide long-term funds -- up to the amount equivalent to the net increase in lending -- at a low interest rate, without any limit, to financial institutions at their request, with a view to promoting their aggressive action and helping increase proactive credit demand of firms and households.
Jan. 2013	Introduction of the "Price Stability Target" of 2 percent ➢ The Bank sets the "price stability target" at 2 percent in terms of the year-on-year rate of change in the consumer price index (CPI) -- a main price index and will pursue monetary easing and aim to achieve this target at the earliest possible time. Introduction of the "Open-Ended Asset Purchasing Method" Release of "Joint Statement of the Government and the Bank of Japan on Overcoming Deflation and Achieving Sustainable Economic Growth"
Apr. 2013	Introduction of the "Quantitative and Qualitative Monetary Easing" ➢ The adoption of the "monetary base control" ➢ An increase in JGB purchases and their maturity extension ➢ An increase in ETF and J-REIT purchases ➢ The Bank will continue with the quantitative and qualitative monetary easing, aiming to achieve the price stability target of 2 percent, as long as it is necessary for maintaining that target in a stable manner.
Oct. 2014	Expansion of the Quantitative and Qualitative Monetary Easing ➢ Accelerating the pace of increase in the monetary base ➢ Increasing JGB purchases and extending the average remaining maturity of JGB purchases ➢ An increase in ETF and J-REIT purchases
Dec. 2015	Introduction of Supplementary Measures for Quantitative and Qualitative Monetary Easing ➢ Measures to support firms' investment in physical and human capital ➢ Measures to facilitate smooth implementation of Quantitative and Qualitative Monetary Easing (QQE) ・ Extending the average remaining maturity of JGB purchases ・ Increasing the maximum amount of each issue of Japan real estate investment trust

	(J-REIT) to be purchased
Jan. 2016	Introduction of "Quantitative and Qualitative Monetary Easing with a Negative Interest Rate" ➢ The Bank will apply a negative interest rate of minus 0.1 percent to current accounts that financial institutions hold at the Bank. Specifically, the Bank will adopt a three-tier system in which the outstanding balance of each financial institution's current account at the Bank will be divided into three tiers (Basic Balance, Macro Add-on Balance, and Policy-Rate Balance), to each of which a positive interest rate, a zero interest rate, or a negative interest rate will be applied, respectively. ➢ The Bank will continue with "QQE with a Negative Interest Rate," aiming to achieve the price stability target of 2 percent, as long as it is necessary for maintaining that target in a stable manner.
Apr. 2016	Introduction of the Funds-Supplying Operation to Support Financial Institutions in Disaster Areas of the 2016 Kumamoto Earthquake
July 2016	Enhancement of Monetary Easing ➢ An increase in purchases of exchange-traded funds (ETFs) ➢ Measures to ensure smooth funding in foreign currencies by Japanese firms and financial institutions
Sept. 2016	Introduction of "Quantitative and Qualitative Monetary Easing with Yield Curve Control" ➢ Yield curve control ・ The short-term policy interest rate: The Bank will apply a negative interest rate of minus 0.1 percent to the Policy-Rate Balances in current accounts held by financial institutions at the Bank. ・ The long-term interest rate: The Bank will purchase Japanese government bonds (JGBs) so that 10-year JGB yields will remain more or less at the current level (around zero percent). With regard to the amount of JGBs to be purchased, the Bank will conduct purchases more or less in line with the current pace -- an annual pace of increase in the amount outstanding of its JGB holdings at about 80 trillion yen -- aiming to achieve the target level of a long-term interest rate specified by the guideline. ➢ New tools of market operations for facilitating yield curve control ・ Outright purchases of JGBs with yields designated by the Bank (fixed-rate purchase operations) ・ Fixed-rate funds-supplying operations for a period of up to 10 years (extending the longest maturity of the operation from 1 year at present) ➢ Inflation-overshooting commitment ・ The Bank will continue with "QQE with Yield Curve Control," aiming to achieve the price stability target of 2 percent, as long as it is necessary for maintaining that target in a stable manner. The Bank will continue expanding the monetary base until the year-on-year rate of increase in the observed CPI (all items less fresh food)

	exceeds the price stability target of 2 percent and stays above the target in a stable manner.
July 2018	Strengthening the Framework for Continuous Powerful Monetary Easing ➢ Introduction of forward guidance for policy rates ・ The Bank intends to maintain the current extremely low levels of short- and long-term interest rates for an extended period of time. ➢ Enhancement of the sustainability of "Quantitative and Qualitative Monetary Easing (QQE) with Yield Curve Control" ・ The Bank will purchase Japanese government bonds (JGBs) so that 10-year JGB yields will remain at around zero percent. While doing so, the yields may move upward and downward to some extent mainly depending on developments in economic activity and prices. With regard to the amount of JGBs to be purchased, the Bank will conduct purchases in a flexible manner so that their amount outstanding will increase at an annual pace of about 80 trillion yen. ・ The Bank will purchase exchange-traded funds (ETFs) and Japan real estate investment trusts (J-REITs) so that their amounts outstanding will increase at annual paces of about 6 trillion yen and about 90 billion yen, respectively. With a view to lowering risk premia of asset prices in an appropriate manner, the Bank may increase or decrease the amount of purchases depending on market conditions.
Mar. 2020	Enhancement of Monetary Easing in Light of the Impact of the Outbreak of the Novel Coronavirus (COVID-19) ➢ The further ample supply of funds by conducting various operations including purchases of Japanese government bonds (JGBs) and the U.S. dollar funds-supplying operations ➢ Measures to facilitate corporate financing ・ Introduction of the Special Funds-Supplying Operations to Facilitate Corporate Financing regarding the Novel Coronavirus (COVID-19) ・ Increase in purchases of CP and corporate bonds ➢ Active purchases of ETFs and J-REITs
Apr. 2020	Enhancement of Monetary Easing ➢ Increase in purchases of CP and corporate bonds ➢ Strengthening of the Special Funds-Supplying Operations to Facilitate Financing in Response to the Novel Coronavirus (COVID-19) ➢ Further active purchases of JGBs and T-Bills
May 2020	Introduction of a New Fund-Provisioning Measure to Support Financing Mainly of Small and Medium-Sized Firms
Mar. 2021	Further Effective and Sustainable Monetary Easing ➢ Establishment of the Interest Scheme to Promote Lending ➢ Clarification of the range of fluctuations in long-term interest rate (the range of 10-year JGB yield fluctuations would be between around plus and minus 0.25 percent)

	➢ Introduction of "fixed-rate purchase operations for consecutive days" ➢ The Bank will purchase ETFs and J-REITs as necessary with upper limits and maintain them even after COVID-19 subsides.
Sept. 2021	Introduction of the Funds-Supplying Operations to Support Financing for Climate Change Responses
Dec. 2022	Modification of the Conduct of Yield Curve Control (YCC) ➢ While significantly increasing the amount of JGB purchases, the Bank will expand the range of 10-year JGB yield fluctuations from the target level: from between around plus and minus 0.25 percentage points to between around plus and minus 0.5 percentage points.
Jan. 2023	Enhancement of the Funds-Supplying Operations against Pooled Collateral
July 2023	Conducting Yield Curve Control (YCC) with Greater Flexibility ➢ The Bank will continue to allow 10-year JGB yields to fluctuate in the range of around plus and minus 0.5 percentage points from the target level, while it will conduct yield curve control with greater flexibility, regarding the upper and lower bounds of the range as references, not as rigid limits, in its market operations.
Oct. 2023	Further Increasing the Flexibility in the Conduct of Yield Curve Control (YCC) ➢ The Bank will regard the upper bound of 1.0 percent for 10-year JGB yields as a reference in its market operations, and in order to encourage the formation of a yield curve that is consistent with the guideline for market operations, it will continue with large-scale JGB purchases and make nimble responses for each maturity by, for example, increasing the amount of JGB purchases and conducting fixed-rate purchase operations and the Funds-Supplying Operations against Pooled Collateral.
Mar. 2024	Changes in the Monetary Policy Framework ➢ The Bank will encourage the uncollateralized overnight call rate to remain at around 0 to 0.1 percent. ➢ Purchase of Japanese government bonds (JGBs) ・ The Bank will continue its JGB purchases with broadly the same amount as before. ➢ The Bank will discontinue purchases of exchange-traded funds (ETFs) and Japan real estate investment trusts (J-REITs). ➢ The Bank will gradually reduce the amount of purchases of CP and corporate bonds and will discontinue the purchases in about one year.
July 2024	Change in the Guideline for Money Market Operations ➢ The Bank will encourage the uncollateralized overnight call rate to remain at around 0.25 percent. Decision on the Plan for the Reduction of the Purchase Amount of Japanese Government Bonds


日本銀行
BANK OF JAPAN