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# Japan's Economy and Prices over the Past 25 Years: Past Discussions and Recent Issues

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# Japan's Economy and Prices over the Past 25 Years: Past Discussions and Recent Issues\*

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December 2024

## Abstract

This paper provides an overview of economic activity and prices in Japan since the 1990s, based on discussions mainly in academia as well as the survey of corporate behavior, and then discusses some issues related to the signs of change in recent years. In the 1990s, monetary policy faced a lower bound on nominal interest rates as the economy fell into stagnation and mild deflation due to various factors both on the demand and supply sides. In the 2010s, the economy recovered thanks to the effects of quantitative and qualitative monetary easing and other measures, which brought about a situation of no longer being in deflation. However, the "price stability target" of 2 percent could not be achieved while people's mindset and practices based on the assumption that wages and prices were unlikely to rise remained. After the pandemic in the 2020s, as the economic recovery and the tightening of labor markets as well as the surge in import prices have strengthened the virtuous cycle between wages and prices, it came in sight that the "price stability target" would be achieved in a sustainable and stable manner. Against this background, signs of change have been seen in the global economic landscape, labor markets, and firms' price-setting behavior. The mindset and practices based on the assumption that wages and prices were unlikely to rise, which took root during the deflation period, appear to be dissolving.

JEL classification numbers: E31, E32, E52, F62, J20, O53

Keywords: Japan's economy, prices, labor market, globalization, monetary policy

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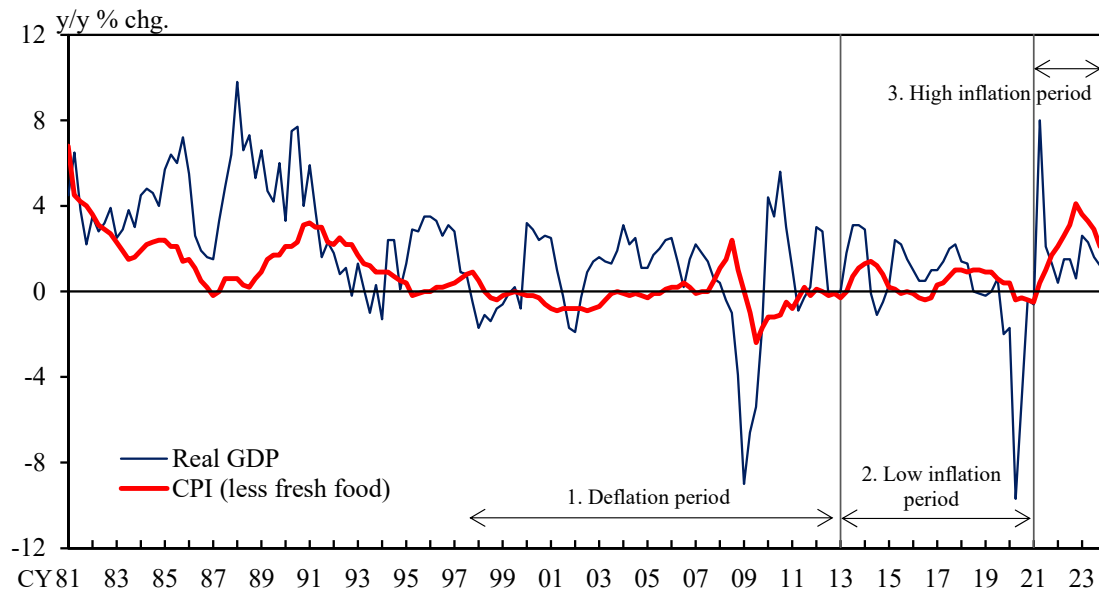
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## 1. Introduction

Japan's economy fell into deflation in the late 1990s, and since then, achieving price stability has been a challenge for a long period of about 25 years, including the 2010s when the economy was no longer in deflation. The Bank of Japan conducts a review of monetary policy from a broad perspective ("Broad Perspective Review"), as one of its objectives, to understand the effects of various monetary easing measures implemented during this period in the context of interactions with developments in economic activity and prices at each point in time. As part of the Review, this paper looks back on the economic and price developments in Japan over the past 25 years and more, including the period around the burst of the bubble economy in the early 1990s, based on discussions mainly in academia as well as the results of the survey on corporate behavior conducted by the Bank recently. The paper will also discuss the background to the prospect that the "price stability target" of 2 percent will be achieved in a sustainable and stable manner through the virtuous cycle between wages and prices, following the economic recovery and the tightening of labor markets as well as the surge in import prices after the pandemic in the 2020s, based on the ongoing analyses conducted by the staff of the Research and Statistics Department of the Bank of Japan. In doing so, we will pay particular attention to how various changes in the economic environment since the 1990s, including the globalization of the economy and the declining and aging population, have affected the developments in economic activity and prices, and to how people's mindset and practices based on the assumption that wages and prices are unlikely to rise, which took root during the period of prolonged deflation, have been changing (or not) in recent years.

In this paper, while looking at the long-term trends of economic growth and inflation (Figure 1), we divide the period covered by the Review into the following three periods. The first is the "deflation period" from the late 1990s when deflation began in the sense that the year-on-year rate of change in consumer prices continued to be zero or slightly negative (or from the early 1990s when the economy began to stagnate), to the early 2010s, when the Bank of Japan introduced the price stability target of 2 percent. During this period, monetary policy faced a lower bound on nominal interest rates as the economy fell into stagnation and mild deflation due to various factors both on demand and supply sides. The second was the "low-inflation period" in the 2010s, when the economy recovered thanks to the effects of quantitative and qualitative monetary easing and other measures, and deflation ceased, but the price stability target could not be achieved. The third is the "high-inflation period" in the 2020s, when the inflation rate rose to the highest level in about 40 years since the early 1980s, partly due to a sharp rise in import prices.

(Figure 1) Economic growth and inflation



Note: The CPI data 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. The latest data are as of 2024/Q1.  
Sources: Cabinet Office; Ministry of Internal Affairs and Communications.

In the remainder of the paper, we will look back on the deflation period in Section 2, the low-inflation period in Section 3, and discuss some issues related to the signs of change in the high-inflation period in Section 4. Section 5 concludes.

## 2. Economic Stagnation and Deflation (the 1990s-2000s)

In this section, we first check the data on the economic activity and prices from a somewhat longer perspective, and then briefly summarize the discussions mainly in academia focusing on the period from the late 1990s to the 2000s.

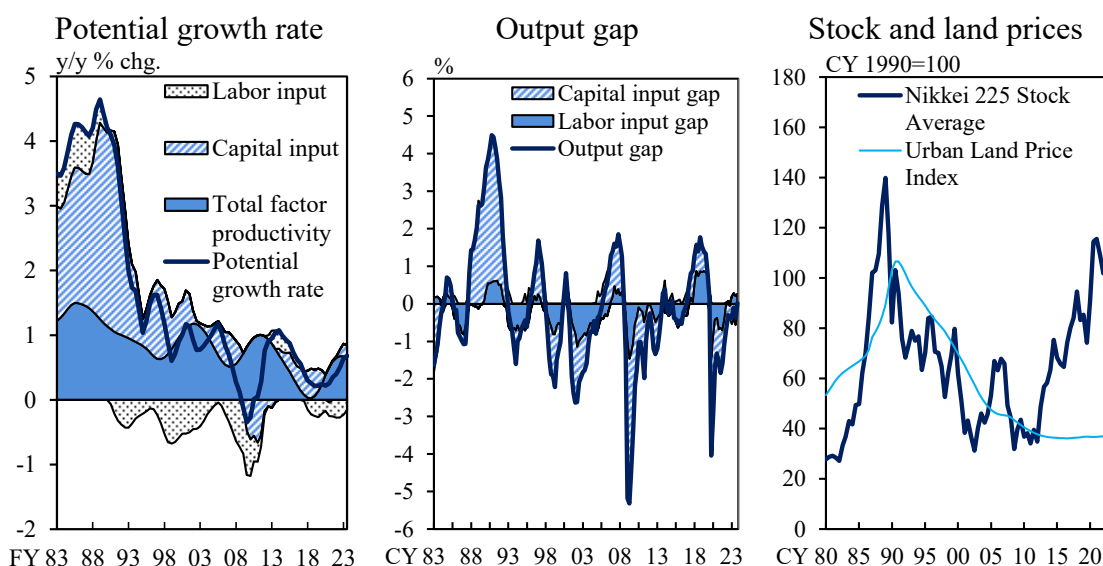
### (Overview of Data)

First, the potential growth rate and output gap estimated by the Research and Statistics Department of the Bank of Japan<sup>1</sup> both declined significantly (the output gap turned negative) in the early 1990s (Figure 2, left and middle panels). Since then, the potential growth rate has remained at around 1 percent to date and has not returned to the rate in the 1980s (around 4 percent), and the output gap has often taken negative values with

<sup>1</sup> The Bank of Japan's Research and Statistics Department estimates potential growth rates and output gaps using a production function approach, and releases these estimates on a regular basis. See Kawamoto et al. (2017) for the estimation method. The Cabinet Office and other agencies also estimate them using a similar approach, and there are no substantial differences between these estimates.

repeated large fluctuations. Behind these changes at the beginning of the 1990s, stock and land prices soared in the late 1980s and plummeted in the 1990s (asset price bubble; Figure 2, right panel).

(Figure 2) Indicators for Economic Developments

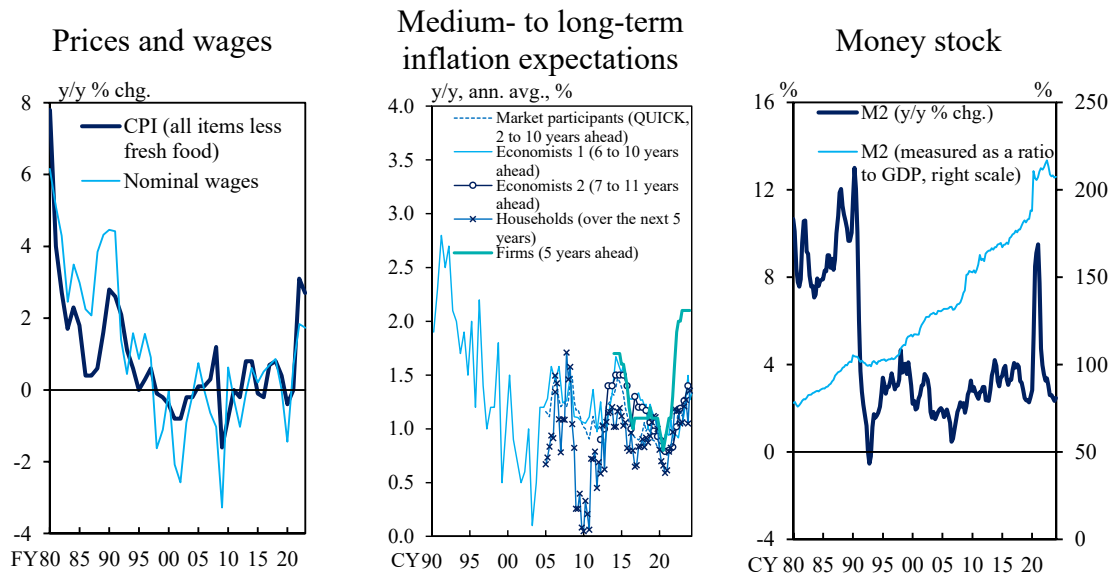


Notes: 1. Potential growth rate and its breakdown in the left panel are staff estimates. The values for the latest period, the second half of fiscal 2023, are those for 2023/Q4.  
 2. Output gap and its breakdown in the middle panel are staff estimates. The latest data are as of 2023/Q4.  
 3. In the right panel, the latest data for the Nikkei 225 Stock Average and the Urban Land Price Index are as of end-March 2024 and end-September 2023, respectively.  
 Sources: Bank of Japan; Bloomberg; Japan Real Estate Institute.

The inflation rate (consumer prices; Figure 3, left panel) stayed at below 2 percent even during the bubble period in the late 1980s<sup>2</sup> and declined to negative (deflationary) territory in the late 1990s. The rate of change in nominal wages per employee (total cash earnings including bonuses, etc.) also sank into negative territory at the same time. Many indicators of medium- to long-term inflation expectations (Figure 3, middle panel), despite the difficulty of measurement due to data limitations, generally hovered at around 1 percent after declining to near zero in the 1990s and early 2000s. The year-on-year growth rate of the money stock (Figure 3, right panel) declined sharply in the early 1990s, but its ratio to the nominal GDP has been on a steady upward trend since the 1980s.

<sup>2</sup> The yen's appreciation and a substantial drop in the price of crude oil were behind the decline in the inflation rate in the mid-1980s.

(Figure 3) Indicators for Price Developments



- Notes: 1. In the left panel, the CPI data are staff estimates and exclude the effects of consumption tax hikes, policies concerning the provision of free education, and travel subsidy programs. Data for nominal wages are the total cash earnings per employee in the *Monthly Labour Survey*. The data cover establishments with 30 or more employees up through fiscal 1990, and with 5 or more employees from fiscal 1991 onward. The latest data are as of fiscal 2023.
2. In the middle panel, "Economists 1" shows the forecasts of economists in the Consensus Forecasts. "Economists 2" shows the forecasts of forecasters surveyed for the ESP Forecast. Data for households are from the Opinion Survey on the General Public's Views and Behavior, estimated using the modified Carlson-Parkin method for a 5-choice question. Data for firms show the inflation outlook of enterprises for general prices (all industries and enterprises, average) in the Tankan. The latest data for "Economists 1," "Economists 2," and the others are as of 2024/Q2, December 2023, and 2024/Q1, respectively.
3. In the right panel, the latest data are as of 2024/Q1.

Sources: Bank of Japan; Cabinet Office; Consensus Economics Inc., "Consensus Forecasts"; JCER, "ESP Forecast"; Ministry of Health, Labour and Welfare; Ministry of Internal Affairs and Communications; QUICK, "QUICK Monthly Market Survey <Bonds>".

### (Economic Stagnation in the 1990s)

Based on the above trends in the potential growth rate and the output gap, the economic stagnation since the early 1990s can be attributed to both supply-side factors, as indicated by the potential growth rate, and demand-side factors, as indicated by the output gap.<sup>3</sup> The supply-side factors pointed out in academia include the decline in the growth rate of total factor productivity (TFP) and the decrease in labor input (the spread of the five-day workweek).<sup>4</sup> The specific factors behind the decline in the growth rate of TFP include labor market rigidities and distortions in resource reallocation among firms.<sup>5</sup> On the other

<sup>3</sup> See, for instance, Ito and Hoshi (2020) for a long history of supply-side and demand-side factors that have affected the Japanese economy.

<sup>4</sup> This was pointed out by Hayashi and Prescott (2002) and was followed by various discussions on the measurement of TFP.

<sup>5</sup> Caballero, Hoshi, and Kashyap (2008) argue that the existence of "zombie" firms in the 1990s

hand, demand factors pointed out were the impact of "stock adjustments" and credit crunch following the collapse of the bubble economy. Corporate demand for capital investment declined in the process of adjusting excess debt, excess equipment, and excess employment. Moreover, the decline in aggregate demand was amplified through delays in the disposal of bad loans by financial institutions and the resulting credit crunch.<sup>6</sup> Furthermore, the prolonged slump in investment affected not only the demand side of the economy but also the supply side, which led to the sluggish potential growth rate.<sup>7</sup>

Some argued that another demand factor was the lack of monetary easing. In particular, it was argued that the yen's tendency to appreciate after the Plaza Accord in 1985 and the failure of monetary policy to stop the sudden decline in the money supply in 1992 led to the subsequent economic slump.<sup>8</sup> It was also pointed out that a series of interest rate cuts throughout the 1990s brought the zero lower bound closer, and the deterioration in the financial conditions of firms and banks impaired a transmission channel of monetary policy (credit channel), making it harder for the effects of monetary easing to work and contributing to the economic slowdown.

### **(Deflation in the late 1990s to mid-2000s)**

The inflation rate slowed down in the early 1990s, but remained positive, as low as in the mid-1980s. It was in the late 1990s when the deflation began. The decline in the inflation rate was also influenced by both supply and demand factors. Particularly around the mid-1990s, the inflow of low-priced imports, deregulation and streamlining of distribution channels to correct the gap between domestic and foreign prices, and technological innovations, especially in the IT-related sector, were prominent as supply-side factors that lowered prices. Behind these factors was the impact of changes in the global economic landscape, including the yen's appreciation, Japan-U.S. trade friction, and the subsequent rise of China and other emerging Asian economies. On the other hand,

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through banks' sham loan restructurings might have discouraged the entry and investment of healthy firms, thereby depressing productivity in the economy. Fukao (2013), on the other hand, points out that the market selection mechanism already did not work very well in the 1980s, and it seems difficult to argue that the "zombie" firm problem was the main cause of the decline in TFP growth in the 1990s.

<sup>6</sup> Such a mechanism was theoretically investigated by Bernanke, Gertler, and Gilchrist (1999) and Kiyotaki and Moore (1997).

<sup>7</sup> According to the decomposition of the potential growth rate shown in the left panel of Figure 2 above, the decline in the growth rate of capital input contributed significantly to the decline in the potential growth rate in the 1990s, suggesting that the decline in capital investment demand had a significant impact on the supply side as well.

<sup>8</sup> The sudden decline in the money supply in 1992 triggered debates over whether monetary policy was too tight and how it could have been handled with the monetary policy tools available at the time.

as for demand factors, in addition to the aforementioned demand factors of economic stagnation, the decline in aggregate demand following the financial crisis of 1998 was significant. The fall in prices under the excess debt has raised concerns of a vicious cycle (debt deflation or "deflationary spiral") that will lead to a further decline in aggregate demand through an increase in the debt burden in real terms. Even after the financial crisis of 1998 subsided, the bursting of the IT bubble overseas in 2001 caused another decline in aggregate demand. In March of the same year, the Japanese government admitted in its *Monthly Economic Report* that Japan's economy was in a "mild deflationary phase" (the so-called declaration of deflation).

Under these circumstances, the Bank of Japan introduced a zero interest rate policy in 1999 and a quantitative easing policy in 2001.<sup>9</sup> In addition, various prudential measures such as the public fund injection into banks, as well as the continued export-led economic recovery against the backdrop of the post-IT bubble recovery in the global economy and the depreciation of the yen, helped to avoid the vicious cycle that had initially been concerned. Although the mild deflation continued for a while after that, consumer prices finally began to bottom out in the mid-2000s when the banks' disposal of bad loans came to an end (the targets in the Program for Financial Revival were achieved).

### **(The 2008 Global Financial Crisis and Subsequent Deflation)**

Although the global financial crisis (GFC) of 2008 did not shake the very foundations of Japan's financial system again, it had a major impact on the real economy. The output gap plummeted to a negative value far exceeding that after the bursting of the bubble economy and the domestic financial crisis in the 1990s, and the potential growth rate temporarily fell into negative territory. Although Japanese companies finally showed signs of a positive investment stance as they have finished de-leveraging of excess debt (balance sheet adjustments) before the GFC, they once again drastically cut back on capital investment and have continued to take a defensive stance ever since.

On the price front, the year-on-year rate of increase in consumer prices, which had exceeded 2 percent immediately before the GFC due to soaring energy prices, fell back again into negative territory, resulting in deflation exceeding that of the early 2000s. The Bank continued to enhance monetary easing, including the implementation of its

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<sup>9</sup> In addition, the Bank introduced a policy for "duration effect" (forward guidance) and released "(The Bank's Thinking) on Price Stability" (not quantified in 2000, but quantified in 2006 as "an understanding of medium- to long-term price stability"). In the meantime, there was a controversy in academic and non-academic circles over the need for a more explicit inflation target.



"Comprehensive Monetary Easing," but it was not easy to stop deflation, partly because other advanced economies also implemented bold monetary easing through substantial interest rate cuts and unconventional policy measures (the yen appreciated against the U.S. dollar due to a narrowing interest rate differential and other factors).

As the economic stagnation and deflation dragged on, there was a debate over the causal relationship between the two: "Did the economic stagnation come first or did deflation come first?" Chronologically, it was clear that the economic stagnation that followed the bursting of the bubble economy and the GFC preceded the subsequent deflation, and the deflationary spiral that plunged both into a massive negative cycle was also avoided. However, there might have been an aspect of low growth and low inflation that reinforced each other and hence became entrenched under repeated shocks (see Appendix 1 for a related discussion on the "deflationary equilibrium").

### **3. Moderate Economic Recovery and Low Inflation (the 2010s)**

This section looks back on the economic and price developments in the 2010s, particularly after the Bank set the "price stability target" of 2 percent in terms of the year-on-year rate of change in the consumer price index and introduced quantitative and qualitative monetary easing (QQE) in 2013. The economy recovered as the real interest rates declined, and the output gap steadily turned positive in the second half of the decade. With this improvement in the output gap and rising inflation expectations, the inflation rate also became positive, but the price stability target of 2 percent could not be achieved by the end of the decade. During this period, there was no significant change in the trend of economic growth, which had been sluggish since the 1990s.

The mechanism by which QQE boosted the economy and prices and its quantitative assessment will be left for other papers in the "Broad Perspective Review". In this paper, we will summarize the discussions mainly in academia on the background to the failure of achieving the price stability target of 2 percent and the failure of the growth trend to increase while the economy recovered. We will also look at the results of the survey on corporate behavior conducted as part of the "Broad Perspective Review" to check how the academic discussions correspond to firms' actual perception.

### **(Low Inflation in the 2010s)**

After the introduction of QQE in 2013, Japan's economy was no longer in deflation in the sense of a sustained decline in prices, but the price stability target of 2 percent had not been achieved. The background to this development has been analyzed in various ways in the *Comprehensive Assessment* (2016) and *Assessment for Further Effective and Sustainable Monetary Easing* (2021) by the Bank of Japan.<sup>10</sup> One of the factors that hampered the achievement of the 2 percent target was the fact that the mechanism of inflation expectations formation in Japan was largely backward-looking or "adaptive" (a shift to forward-looking expectations formation influenced by the central bank's inflation target not progressing as expected). As the actual inflation declined following exogenous developments such as the decline in crude oil prices, weakness in demand after the consumption tax rate hike, and the slowdown in emerging economies and volatile global financial markets, inflation expectations also weakened through the adaptive expectations mechanism. It was also pointed out that through the experience of prolonged deflation and low inflation, people's mindset and practices based on the assumption that prices were unlikely to rise might have taken root as a norm in society.

In the meantime, academic studies using micro-price data revealed the specific mechanisms and severity of price rigidity, including the practices of keeping prices unchanged, which became entrenched through interaction among firms (strategic complementarity) as it became difficult to raise prices when other firms kept their prices unchanged, and non-price competition (such as stealth price hikes) spread when price hikes were difficult to implement. In relation to these phenomena, research also advanced on changes in the competitive environment for firms (e.g., declining price markups) and changes in the relationship between macroeconomic environment and inflation (e.g., the flattening of the Phillips curve).

Moreover, the relationship between nominal wages and prices has attracted attention because of the particularly strong rigidity in services prices, in which the share of labor cost is high. Nominal wages began to decline at almost the same time as the deflation began in the late 1990s, reflecting unique features of the Japanese labor market, such as workers' acceptance of lower wages to protect their jobs and firms' efforts to curb total labor costs by increasing low-wage, non-regular employment while maintaining regular

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<sup>10</sup> For the *Comprehensive Assessment* and *Assessment for Further Effective and Sustainable Monetary Easing*, see Bank of Japan (2016, 2021), respectively. In addition, Ikeda et al. (2022a) provides an overview of discussions on recent price developments in Japan.

employment. These were considered as a powerful factor in explaining the emergence of deflation in Japan unlike other countries. Subsequently, in the 2010s, various structural factors, such as the dual labor market with regular and non-regular employment and the elastic labor supply of women and the elderly were pointed out as the background to the weak wage growth even when labor market conditions became increasingly tight. These factors might have led to the spread of the mindset and practices based on the assumption that not only prices but also wages were unlikely to rise, and such a broad norm, which cannot be explained simply by adaptive expectations mechanism for prices, might have taken root.

Other deflationary factors that have persisted since the 1990s, including downward cost pressure due to the globalization and concerns of households and businesses about the future caused by the aging population and other factors, continued to be pointed out. We will discuss them, along with signs of change in recent years, later in Section 4.

### **(Economic Recovery and Growth Trends in the 2010s)**

The QQE stimulated aggregate demand and contributed to a long-lasting economic recovery, especially through tighter labor markets and increased employment. While it is well known that a large-scale negative demand shock, such as a financial crisis, can have a negative impact on the supply side of the economy as well through the stagnation of capital investment and an increase in unemployment (the so-called hysteresis effect), it may also be possible that a persistent positive demand shock has a positive hysteresis effect on the supply side, if the economy continues to overheat (high-pressure economy).<sup>11</sup> The QQE could have a positive effect on the potential growth rate and natural rate of interest through such a mechanism, but it is also pointed out that an extended period of monetary easing could have a negative side effect on the supply side of the economy by distorting resource allocation through the survival of low productivity firms.<sup>12</sup> It is not easy to quantitatively assess the impact of QQE alone on the supply side, but in any case, no significant changes in the potential growth rate or growth trends over the longer run were observed before and after the introduction of QQE.

Since the 1990s, various problems have been pointed out as factors contributing to

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<sup>11</sup> Yellen (2016) pointed out the possibility of the high-pressure economy and a positive hysteresis effect in the context of monetary policy.

<sup>12</sup> Makabe and Yagi (2024) conduct an empirical analysis of firms that survived in a low interest rate environment with the support of banks, and firms that continue to have relatively low productivity.

Japan's stagnant potential growth and productivity, including sluggish domestic capital investment, insufficient investment in and inefficient utilization of IT and intangible assets, changes in industrial structure and stagnant resource reallocation among firms, and labor market rigidities (such as Japanese-style employment practices and the dual labor market).<sup>13</sup> In addition, as background to these problems, the following issues have also been pointed out: Japanese firms are expanding their operations overseas but their international competitiveness is declining; firms' growth expectations are declining and households are worried about their future in anticipation of a declining domestic population; there are corporate governance problems and a lack of animal spirits; and there are various problems in regulatory and competition policies. As mentioned earlier, Japanese firms had largely completed the de-leveraging of excess debt (balance sheet adjustments) by the mid-2000s, but were unable to shift to a more positive investment stance in the wake of subsequent events including the GFC. In addition, the excess employment of full-time workers following the collapse of the bubble economy remained unadjusted for a long time afterward; it is considered to have contributed to the stagnant labor productivity as well as wages through a shift to non-regular employment and a curb on human capital investment.

Furthermore, in relation to low inflation, it was pointed out that the type of Japanese firms' innovation and productivity improvement was biased toward cost-cutting "process innovation" rather than demand-creating or frontier-breaking "product innovation."<sup>14</sup> While the former type of innovation might have been appropriate for individual firms in terms of increasing productivity and profitability, it might have led to a decline in aggregate demand and thus deflation in the economy as a whole. In this sense, Japan's economy might have fallen into a vicious cycle of contractionary equilibrium or the fallacy of composition.

### **(Economic and Price Developments until the 2010s Based on Corporate Survey)**

The *Survey regarding Corporate Behavior since the Mid-1990s*,<sup>15</sup> conducted as part of the Bank's "Broad Perspective Review," covered approximately 2,500 firms (with the response rate of approximately 90 percent) across a wide range of industries and sizes,

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<sup>13</sup> See Nakamura, Kaihatsu, and Yagi (2019), Yagi, Furukawa, and Nakajima (2022), and others for discussions on factors contributing to stagnant productivity. See also Fukunaga, et al. (2024) for discussions on the potential growth.

<sup>14</sup> See Aoki and Yoshikawa (2007) for discussion on the demand creation effects of product innovation.

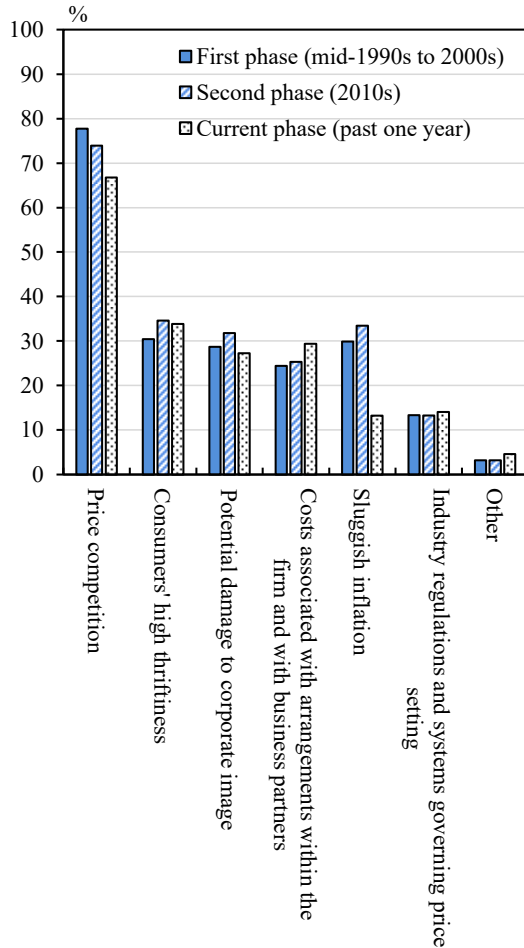
<sup>15</sup> See Bank of Japan (2024a) for detailed survey results.

from large firms to small and micro firms. The survey asked a wide range of questions, including those about price and wage setting and investment stance over the past 25 years since the mid-1990s, by dividing this period into three phases, namely, the first half of the period (from the mid-1990s to around the 2000s), the second half (around the 2010s), and the current phase (the past year or so). In this section, we will summarize the results (multiple-choice answers and interview responses) up to the 2010s, and check how the above academic discussions correspond to the survey results.

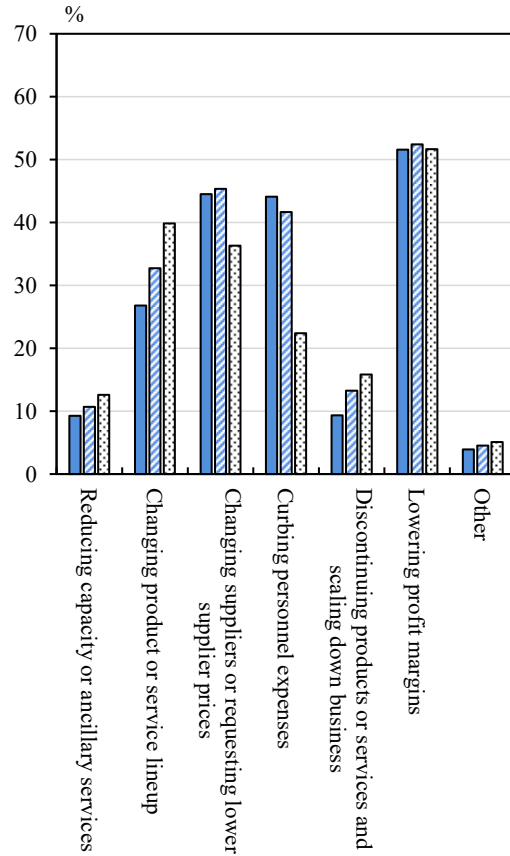
First, with regard to price setting, about 80 percent of the respondents indicated that it was difficult to pass on higher costs to prices until the 2010s. As triggers of the difficulty in raising prices during the 1990s, many firms cited "consumers' preference for lower prices" and firms' "cost-cutting strategies." Subsequently, a vast majority of respondents selected "price competition" as the reason why it was difficult to pass on higher costs to prices (Figure 4, left panel). This result is consistent with the aforementioned academic studies showing that the practice of keeping prices unchanged spread through interaction among firms. As for the measures adopted to address cost increases, many firms selected "lowering profit margins" as well as "curbing personnel expenses" and "changing suppliers or requesting lower supplier prices" (Figure 4, right panel).

(Figure 4) Results of the Survey regarding Corporate Behavior (Price Setting)

Reasons for the difficulties in passing on higher costs to prices



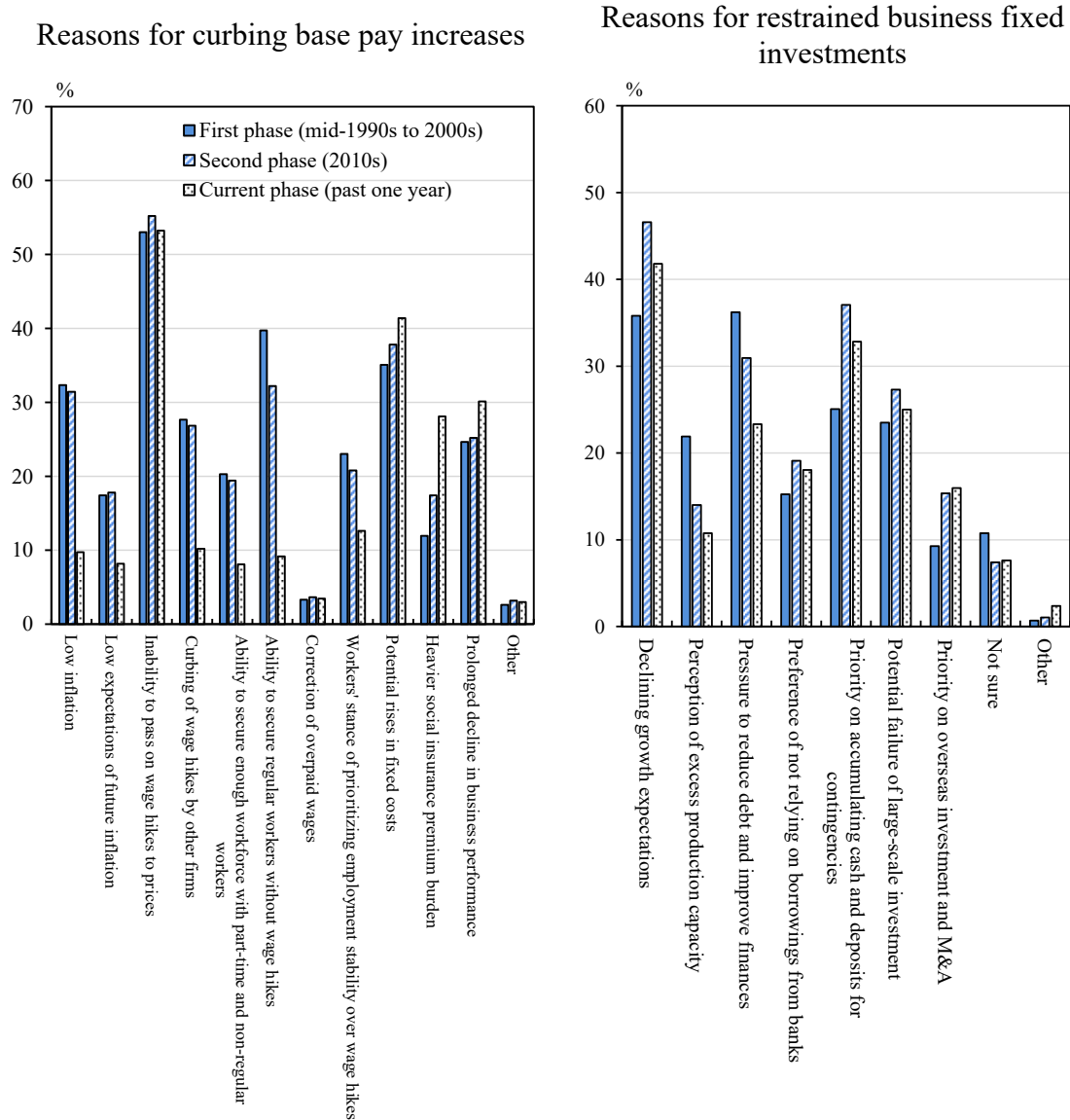
Measures adopted to address cost increases



Note: The shares of firms that responded with either "applicable" or "applicable to some extent" to the question that asked about difficulties in passing on higher costs to prices are shown. Of all the respondents, about 80 percent of firms in the first phase and the second phase and about 70 percent in the current phase are included. Up to three reasons were allowed.  
Source: Bank of Japan (2024a).

With regard to wage setting, an overwhelming majority of respondents recognized that basic wages (base pay) increases for regular workers were sluggish in the period up to the 2010s. The common reasons for this were "inability to pass on wage hikes to prices," "ability to secure regular workers without wage hikes," and "potential rises in fixed costs" (Figure 5, left panel). In addition, "heavier social insurance premium burden" was also frequently cited, especially by small- and micro firms. The perception of firms regarding basic wages and social insurance premiums for regular workers as "fixed costs" that are difficult to reduce may reflect the fact that, as noted above, employment adjustments for full-time workers had not progressed for a long time.

(Figure 5) Results of the Survey regarding Corporate Behavior  
(Wages and Investments)



Note: The left panel shows shares of firms that responded with either "applicable" or "applicable to some extent" to the question that asked about sluggish growth in regular workers' basic wages. Of all the respondents, about 80 percent of firms in the first phase and the second phase, and about 50 percent in the current phase are included in the left panel. Up to five reasons were allowed in the left panel, and up to three reasons were allowed in the right panel.  
Source: Bank of Japan (2024a).

Finally, as reasons for the pace of increase in domestic business fixed investment having remained moderate relative to that of improvement in cash flow, many firms selected "declining growth expectations," "pressure to reduce debt and improve finances (especially through the 2000s)," and "priority on accumulating cash and deposits for contingencies (especially in the 2010s)" (Figure 5, right panel). Also, "priority on overseas investment and mergers and acquisitions (M&A)" was selected by many

respondents, especially large companies. As mentioned earlier, the results suggest that, with declining growth expectations for the domestic economy and the experience of repeated negative shocks, it was hard for firms to let down their guard against future risks even after their balance sheet adjustments were completed.

#### **4. Signs of Change (the 2020s)**

In this section, we discuss the background to the prospect that the price stability target of 2 percent will be achieved in a sustainable and stable manner through the virtuous cycle between wages and prices, following the experience of high inflation of well above 2 percent caused by the economic recovery and the tightening of labor markets as well as the surge in import prices after the pandemic in the 2020s. Our discussion in this section is based on the ongoing analyses conducted by the staff of the Research and Statistics Department of the Bank of Japan. We will selectively examine how the factors that had long depressed the economy and prices since the 1990s have changed or remained unchanged, focusing in particular on (1) the global economic landscape, (2) labor markets, and (3) firms' price-setting behavior, in which signs of change have been seen since before and after the pandemic.

##### **4-1. Global Economic Landscape**

The globalization of the market economy following the end of the Cold War in the 1990s, and especially the rise of emerging Asian economies since the 2000s (China joined the WTO in 2001), has often been cited as the background to Japan's economic stagnation and deflation. In general, growing trade and foreign direct investment (FDI) under globalization are considered to enhance the productivity of each economy mainly through the spillover of knowledge, promotion of research and development (R&D) activities, more efficient resource allocation, and easier access to inexpensive intermediate goods and factors of production. In the case of Japan, however, since its competitiveness has declined compared to emerging Asian economies, the benefits of globalization might not have been fully realized.<sup>16</sup> In recent years, there have been a number of circumstances that suggest a retreat from globalization, such as trade tensions between the United States and China and heightened geopolitical risks in various regions. For Japan's economy, this change could exert further downward pressure, but it could also bring a relative advantage

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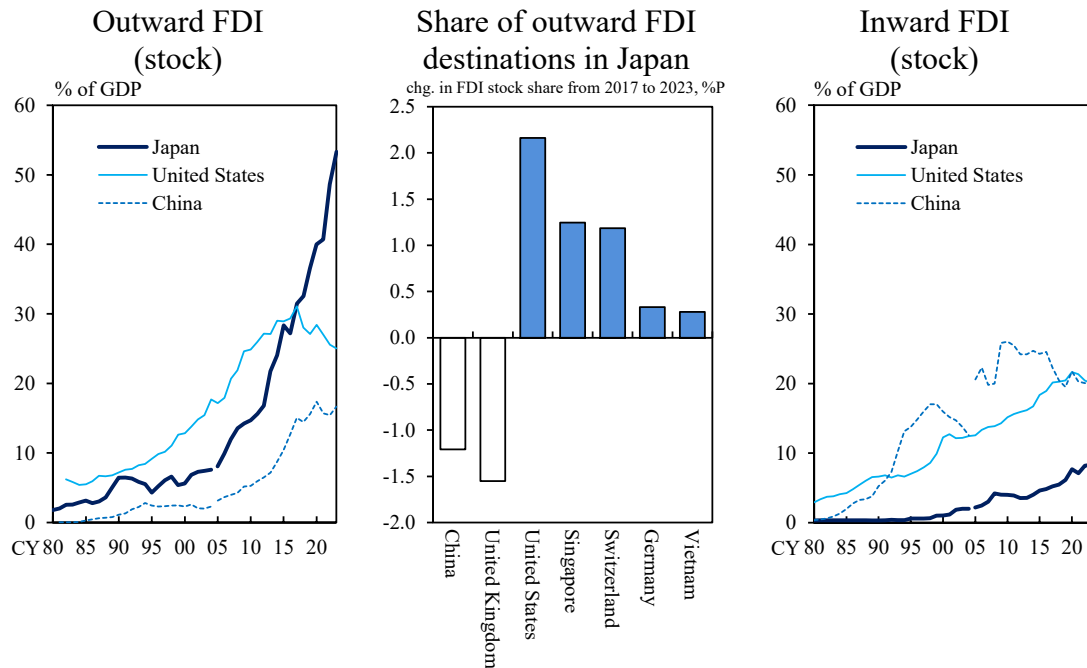
<sup>16</sup> Various features and issues related to the effects of globalization on Japan's economy and prices are summarized in Bank of Japan's Research and Statistics Department (2024) and Hogen et al. (2024).



over other countries and trigger an upward trend. On the other hand, with regard to the impact of globalization on prices, it has been widely pointed out that the expansion of supply capacity in emerging economies has exerted downward pressure on prices in advanced economies, but the recent retreat of globalization is expected to work in the opposite direction, pushing up prices.

In the following, we examine these signs of change by presenting specific data and the results of empirical analyses. First, the stock of outward FDI in Japan, the United States and China (Figure 6, left panel) had been on an increasing trend since the 1990s (with a fluctuation during the bubble economy of the late 1980s in Japan), but has plateaued in the United States and China since the late 2010s. In Japan, the rise in the stock of FDI (as a percentage of GDP) tended to accelerate in the 2010s, and this trend has continued into the 2020s, while the share of investment destinations has shifted from China and the United Kingdom to the United States, Southeast Asia, and continental European countries amid recent changes in the global economic landscape (Figure 6, middle panel). On the other hand, Japan's stock of inward FDI has been conspicuously small compared with its stock of outward FDI (Figure 6, right panel). While the stock of inward FDI in the United States and China has either slowed or started to decline in recent years, Japan's stock of inward FDI has continued to grow, but signs of any particular acceleration are limited. To sum up, the outward and inward FDI data for some major countries have shown signs of a recent retreat in globalization, but there has been no significant change in FDI trends for Japan so far.

(Figure 6) Outward and Inward FDI



Note: In the left- and right panels, there is a discrepancy between 2004 and 2005 in the data for Japan and China due to the change in statistical sources (UNCTAD up to 2004, IMF from 2005 onward). The middle panel is a staff estimate based on the 2023 flow data.

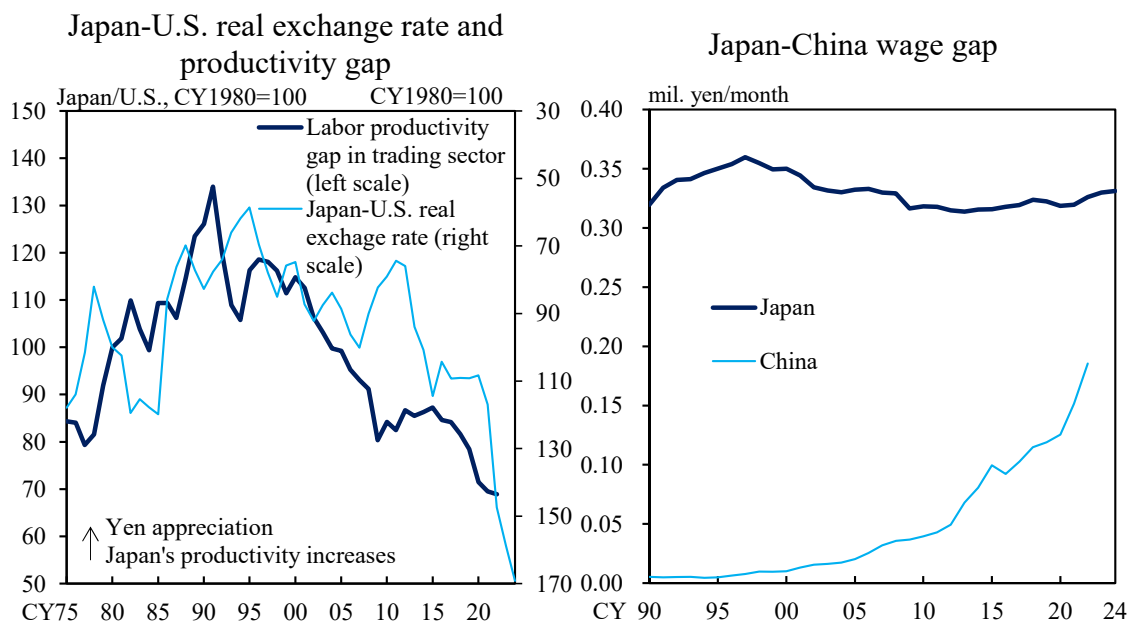
Sources: BEA; IMF; Ministry of Finance; UNCTAD; Bank of Japan.

Next, we look at the competitiveness of Japan's economy relative to the United States and China and its position in the global value chain (GVC). The trend of relative labor productivity between the Japanese and U.S. trading sectors (manufacturing, information and communications) reversed around 1990, and since then, U.S. productivity growth has outpaced that of Japan (Figure 7, left panel). This may have led to the long-term trend of yen's real depreciation against the U.S. dollar through a "reverse Balassa-Samuelson effect" from Japan's perspective.<sup>17</sup> In the meantime, the narrowing of the productivity gap between Japan and China (a rapid increase in China's productivity) has also led to a rapid narrowing of the wage gap reflecting developments in the exchange rate between the two countries. The wage level in Japan was more than 30 times that in China in the 1990s, but it has narrowed to less than twice that in the beginning of the 2020s (Figure 7,

<sup>17</sup> The Balassa-Samuelson effect refers to a mechanism in which an increase in the productivity in a country's trading sector leads to an appreciation in the real exchange rate of the country's currency through spillovers to wages and prices in the domestic non-trading sector. It has been considered a powerful mechanism to explain the real appreciation of the Japanese yen until the mid-1990s. Hogen and Kishi (2024) show that the above mechanism can explain to a considerable extent the real appreciation of the yen against the U.S. dollar from the 1970s to the 1990s and its depreciation thereafter (the reverse Balassa-Samuelson effect) by estimating a two-country dynamic stochastic general equilibrium model for Japan and the United States.

right panel). Japan's stagnant productivity compared to the United States and China explained above suggests that Japan could not have fully enjoyed the benefits of globalization, and the depreciation in the yen's real exchange rate and the worsening terms of trade may have had a negative impact on households' income formation through the suppression of real wages.

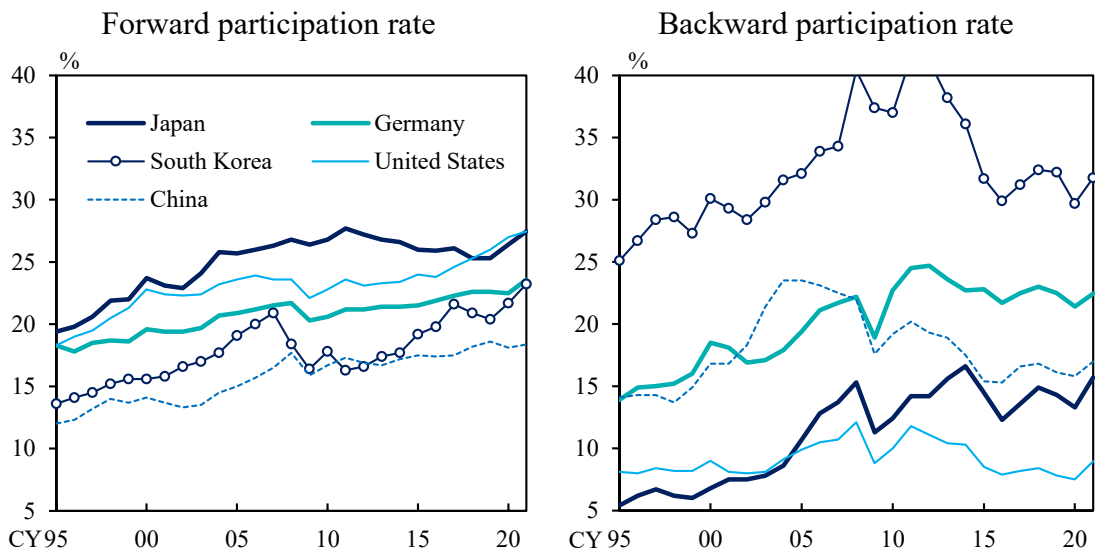
(Figure 7) International Competitiveness of Japan's Economy



Note: Japan-U.S. real exchange rate is calculated based on the overall CPI and JPY-USD exchange rate. The data for 2024 is the January-March average. Trading sector refers to manufacturing and information and communication industries. Wages for Japan represents total cash earnings for companies with 5 or more employees; the data for 2024 is the January-March average. Wages for China represent the average wages for non-private companies located in urban areas.  
Sources: BEA; BLS; Cabinet Office; EUKLEMS; Haver; Ministry of Health, Labour and Welfare; Ministry of Internal Affairs and Communications; National Bureau of Statistics of China; Bank of Japan.

Regarding Japan's position in the GVCs, the forward participation rate (the value added supplied by Japan in the exports of other countries) has been higher than that of other countries, while the backward participation rate (the value added supplied by other countries in the exports of Japan) has been lower than that of other countries, suggesting that Japan has been relatively upstream in the export process across countries. In the 2010s, however, Japan's forward participation rate started to decline (Figure 8, left panel). In other words, Japan's relative position in the GVCs compared to the United States and China has been changing in the sense that Japan is increasingly participating in GVCs from a more downstream position by using low-priced intermediate goods imported from other countries (Figure 8, right panel), in addition to supplying intermediate goods to other countries. Thereafter, since the 2020s, Japan's forward participation rate has risen slightly, and it is worth paying attention to whether this will be a sign of a recovery in the competitiveness of Japanese exporters.

(Figure 8) Participation Rate in the GVCs



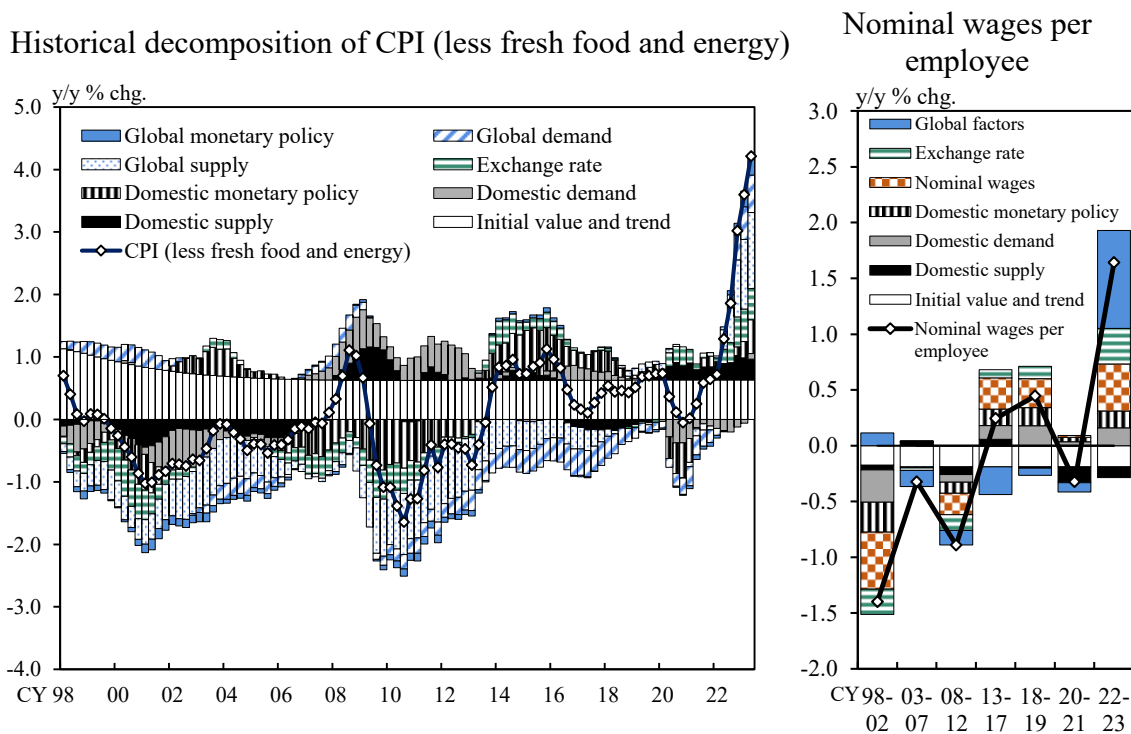
Note: Based on the Trade in Value Added. The latest value (2021) is an estimate based on the ADB's data.  
Sources: ADB; OECD.

Finally in this subsection, we discuss the impact of globalization on prices in Japan. A time-series analysis using macroeconomic variables for Japan and other countries shows that "global supply shocks," which include downward cost pressure due to rising productivity in emerging economies, and "global demand shocks," which capture other global factors, had continuously put downward pressure on Japan's consumer prices since the late 1990s until the late 2010s, including after the introduction of QQE (Figure 9, left panel).<sup>18</sup> In many other advanced economies, the downward pressure on prices from emerging economies seemed to have dampened in the 2010s, against the backdrop of the trade slowdown following the GFC and the narrowing wage gap between advanced and emerging economies. In Japan, however, the aforementioned fact that the growth of Japan's FDI accelerated and its backward participation rate in GVCs increased in the 2010s, might have led to the continuation of downward pressure due to global factors on domestic prices. The same time-series analysis also shows that the contribution of these global shocks reversed and significantly pushed up prices in the 2020s, and these global shocks include not only temporary shocks reflecting the surge in energy prices but also persistent shocks reflecting the retreat of globalization since the late 2010s. Moreover, according to a similar time-series analysis, global shocks had not significantly affected nominal wages until the 2010s, but pushed them up in the 2020s, suggesting that the

<sup>18</sup> For details on the time-series analysis, see Fukunaga, Kido, and Suita (2024). Other analyses on various (including global) factors of Japan's inflation include Nishizaki, Sekine, and Ueno (2014).

upward pressure on prices caused by global shocks may have spread to nominal wages through wage negotiations (Figure 9, right panel).<sup>19</sup> Although it is not easy to predict the future direction and persistence of global shocks, the effects of these shocks to date have been more persistent than initially expected through the interrelationship between wages and prices (the second-round effects). In that sense, the global shocks that have pushed up prices in the 2020s provided an important impetus for subsequent changes in Japan's inflation trend.

(Figure 9) Effects of Global Factors on Japan's Prices and Wages



Note: The CPI data 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. Shocks are identified using a structural VAR model of Japanese and global macroeconomic variables, with sign and zero restrictions imposed on both the short and long term. Estimation period is 1995/Q4 - 2023/Q2. For details, see Fukunaga, Kido, and Suita (2024).

Sources: Cabinet Office; Fukunaga, Kido, and Suita (2024); Haver; IMF; Ministry of Health, Labour and Welfare; Ministry of Internal Affairs and Communications; OECD; Bank of Japan.

<sup>19</sup> According to an analysis using a model that more explicitly takes into account the structure of product and labor markets (Nakamura et al. 2024), a large part of the recent price increases in Japan was explained by product-market specific shocks such as energy and food price spikes, while the portion explained by these factors for nominal wage increases was relatively small.

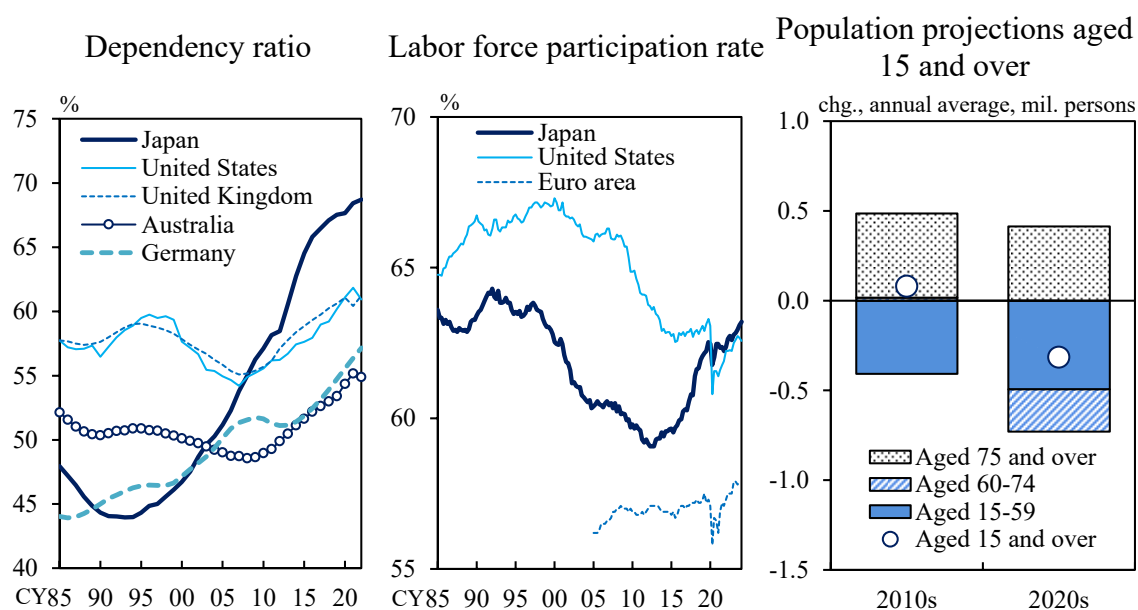
## 4-2. Labor Market

The aging population and declining birthrate in Japan have progressed at a faster pace than in other advanced economies. The working-age population and the total population peaked and began to decline in the mid-1990s and the late 2000s, respectively, which have also been pointed out as a reason for economic stagnation and deflation. As suggested by the decomposition of the potential growth rate presented in Section 2 (above Figure 2, left panel), the direct impact of the declining labor input on the subsequent economic stagnation was not necessarily large. However, it is possible that the delays in the adjustments of industrial structure and resource allocation in response to demographic changes as well as a decrease in demand for domestic investment due to the expectation of declining population may have put indirect downward pressure on the economy and prices. On the other hand, from the perspective of the domestic supply-demand balance, the fact that the ratio of the dependent population (young and old) to the working-age population has been rising rapidly, surpassing that of other advanced economies (Figure 10, left panel), may imply that wages and prices have become more likely to rise through tighter labor market conditions.<sup>20</sup>

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<sup>20</sup> The impact of the aging population on prices is often considered to work in the negative direction through pushing down the natural rate of interest and reducing the effects of monetary easing under a lower bound on nominal interest rates, in addition to decreasing demand for investment as mentioned above. In contrast, Goodhart and Pradhan (2020) argue that an increase in the dependent population ratio will work in the positive direction for prices in the future in many advanced economies by tightening goods and labor market conditions.

(Figure 10) Changes on the Labor Supply Side



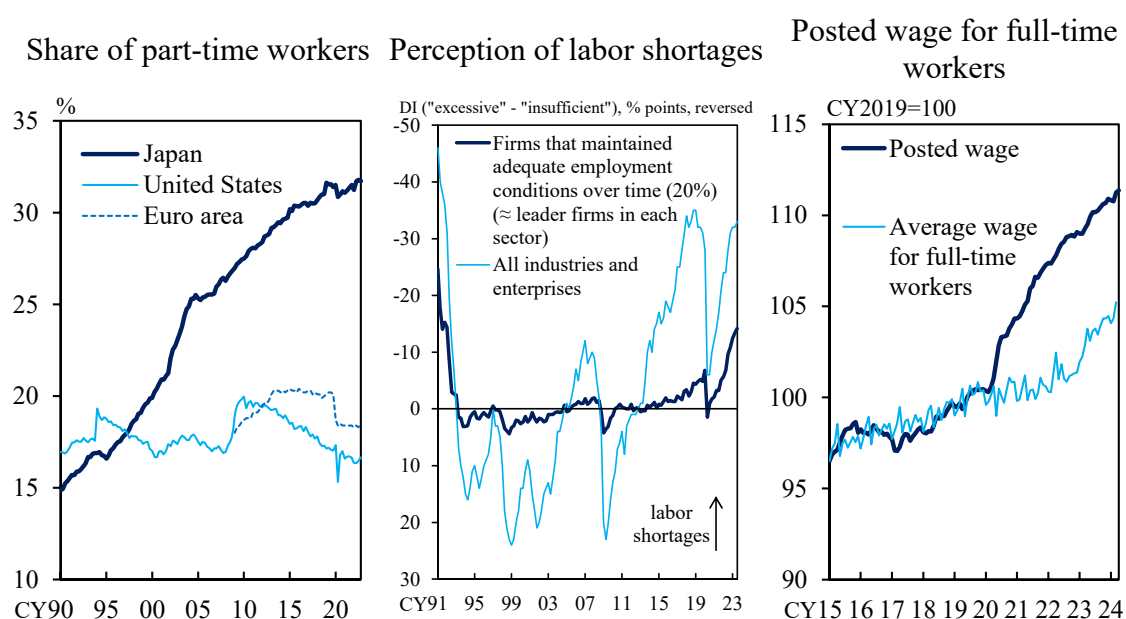
Note: In the left panel, dependency ratio = (total population – working-age population) / total population x 100. In the right panel, the data for the 2020s is based on the outlook for 2029. The latest values in the left and middle panels are for 2022 and 2024/Q1, respectively.  
Sources: Ministry of Internal Affairs and Communications; National Institute of Population and Social Security Research; OECD; World Bank.

Regarding recent changes on the labor supply side, Japan's labor force participation rate (labor force population divided by population aged 15 and over) rose sharply in the 2010s as the labor supply of women and the elderly increased, but the pace of the increase has slowed since the beginning of the 2020s, partly due to the pandemic (Figure 10, middle panel). In addition, the population aged 15 and over has also clearly started to decline in the 2020s, especially since the "baby boomers" will be over 75 years old by the mid-2020s and thus the population aged 60-74 has started to decline significantly (Figure 10, right panel). In light of these changes, the room for additional labor supply in the future is considered to be shrinking, and labor market conditions appear to be getting tighter, making it easier to raise wages at least from the labor supply side.

Regarding recent structural changes in the labor market, the ratio of part-time workers, which had been rising continuously since the 1990s, has plateaued somewhat since the latter half of the 2010s (Figure 11, left panel). The average wage of all workers had been pushed down by the increase in the ratio of part-time workers who receive lower wages, but as the increasing trend of part-time worker ratio slows and the wage gap between part-time and full-time workers tends to narrow, the downward pressure on the average wage is expected to abate. In addition, many firms assess the current labor market conditions to be tight, and even those that had assessed the conditions to be "adequate" in the past

(many of which are thought to be a leader firm in each industry) have recently been experiencing a growing sense of labor shortages (Figure 11, middle panel), suggesting that labor shortages are partly arising from structural changes such as the increased labor mobility. The fact that posted wages in job advertisement data have grown well above the wages actually paid to full-time workers since the beginning of the 2020s (Figure 11, right panel) also suggest that job-to-job transitions for regular workers are becoming more active. These structural changes in the labor market may also have contributed to the shift to a situation where wages are more likely to rise.<sup>21</sup>

(Figure 11) Structural Changes in the Labor Market



Note: The latest data in the left panel are for 2022/Q4. In the middle panel, "Firms that maintained adequate employment conditions over time" refers to firms that responded that the employment conditions are "adequate" for approximately 90 percent of the time during the period from 1991 to 2019. The latest data in the middle panel are those for 2023/Q3. In the right panel, "posted wage" is the average posted wage for full-time workers based on major online job board, using the method proposed by Furukawa et al. (2023). The latest data of the posted wage and average wage for full-time workers are for April and March 2024, respectively.

Sources: BLS; Eurostat; HRog, Co., Ltd.; Ministry of Health, Labour and Welfare; Bank of Japan.

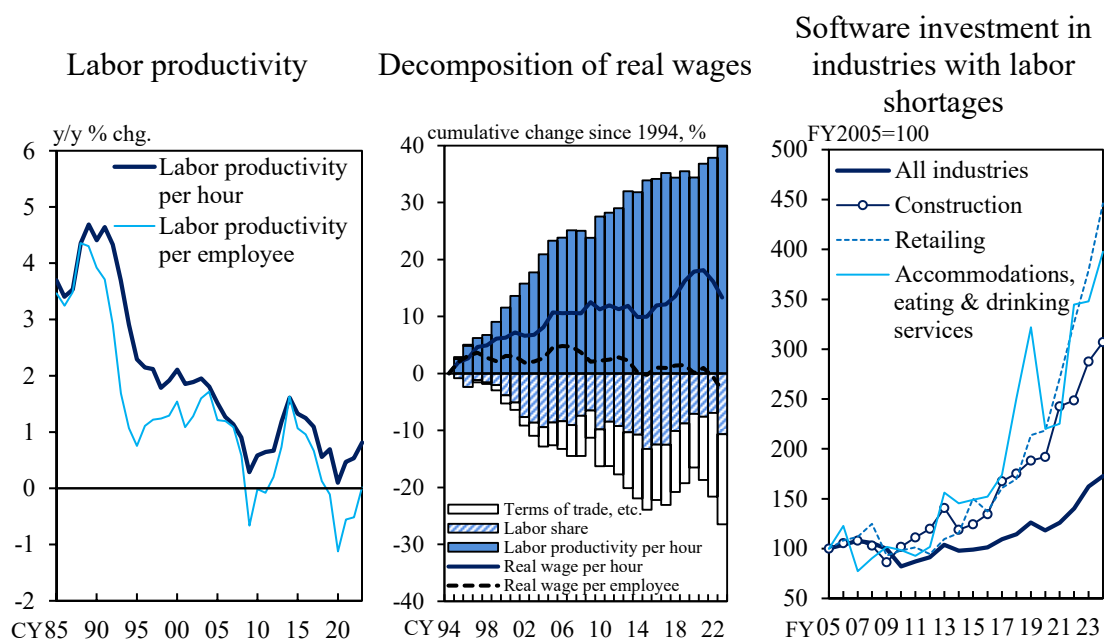
Finally in this subsection, we look at the developments in labor productivity, which determines firms' labor demand and the sustainability of wage growth. Although the growth of labor productivity has increased slightly in the 2020s, the downward trend has continued in the long run, and in particular, the growth of labor productivity per employee fell into negative territory in the second half of the 2010s. This sluggish growth in labor productivity has led to sluggish growth in real wages. In addition, the declining labor

<sup>21</sup> Fukunaga et al. (2023) show that there are signs of change in various factors that had previously dampened wage growth due to structural changes in the labor market in recent years. Of these, Furukawa, Kido, and Hogen (2023) provide a detailed analysis of the job market for regular workers.



share and the worsening terms of trade, the latter of which include the impact of the recent surge in import prices, have also exerted cumulative downward pressure on real wages (Figure 12, middle panel). In the meantime, there are some positive signs that software investment has increased dramatically in recent years in labor-short industries such as construction, retail, accommodations, and eating and drinking services (Figure 12, right panel). In these industries, an increase in labor productivity through the substitution of labor for capital (labor-saving investment) is expected.<sup>22</sup>

(Figure 12) Labor productivity



Note: The left panel shows 5-year moving averages. The latest data in the left and middle panels are those for 2023. In the right panel, the values for 2023 are estimates, and those for 2024 are projections.  
Sources: Cabinet Office; Ministry of Health, Labour and Welfare; Ministry of Internal Affairs and Communications; Bank of Japan.

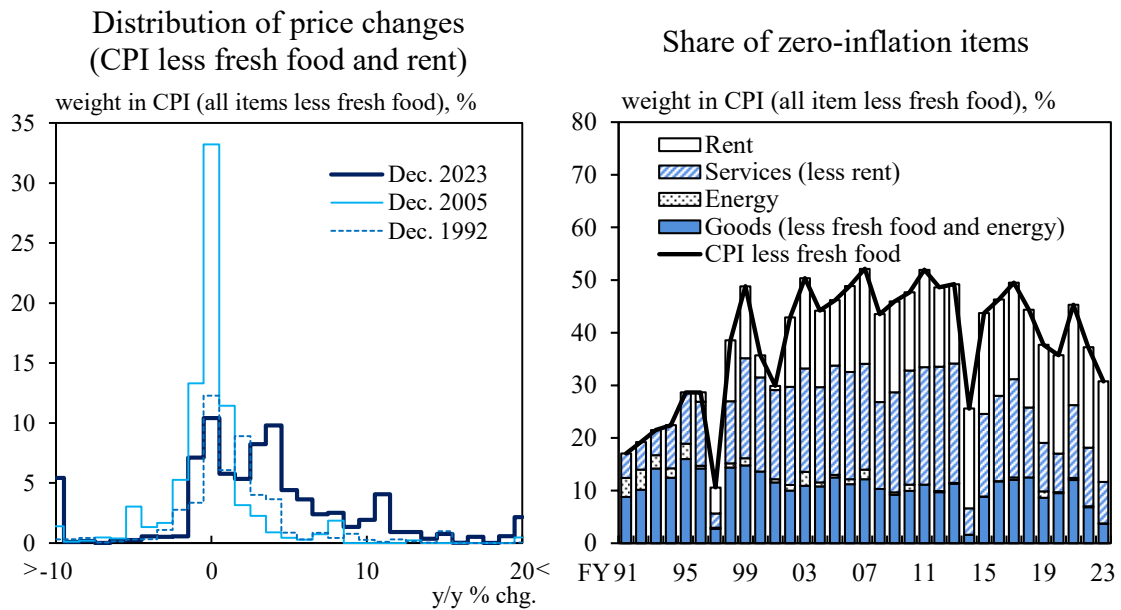
### 4-3. Price-Setting Behavior of Firms

As discussed in Section 3, the mindset and practices based on the assumption that wages and prices are unlikely to rise have taken root as norms in society through the experience of deflation and low inflation since the 1990s, which has been pointed out as one of the reasons why it has taken a long time to achieve the price stability target. In this subsection, we present several analyses of firms' price-setting behavior and discuss whether these norms have changed since the 2020s.

<sup>22</sup> Ikeda, Chikamatsu, and Yagi (2023) discuss the effects of demographic changes on medium- to long-term business fixed investment and show that firms facing labor shortages tend to be active in making investment in tangible fixed assets and software.

First, we summarize some basic facts about firms' price-setting behavior since the 1990s, based on data from the Consumer Price Index (CPI) and its underlying statistics, the *Retail Price Survey*. In the distribution of item-level price changes (excluding rent) as of December 2023 (Figure 13, left panel), the peak that used to be high at around zero percent has collapsed and the distribution has shifted to the right (positive). The height of the peak of the zero inflation (Figure 13, right panel), or the share of zero-inflation items, rose toward the end of the 1990s and remained elevated for nearly two decades (except for the years when the consumption tax rate was raised), but it has clearly declined since the early 2020s and is below the level of the early 1990s, except for rent. When the peak was formed in the 1990s, the contribution of zero-inflation goods did not change significantly, but the contribution of services increased substantially, especially rent, which remained high until recently.<sup>23</sup>

(Figure 13) Distribution of Item-level Changes in the CPI



Note: The left panel displays the histogram in 1 percent increments, excluding upper and lower bounds. In the right panel, zero-inflation items are defined as items of which annual inflations are within the  $\pm 0.5$  percent range. Data for 2023 are the averages of those from April 2023 to February 2024.

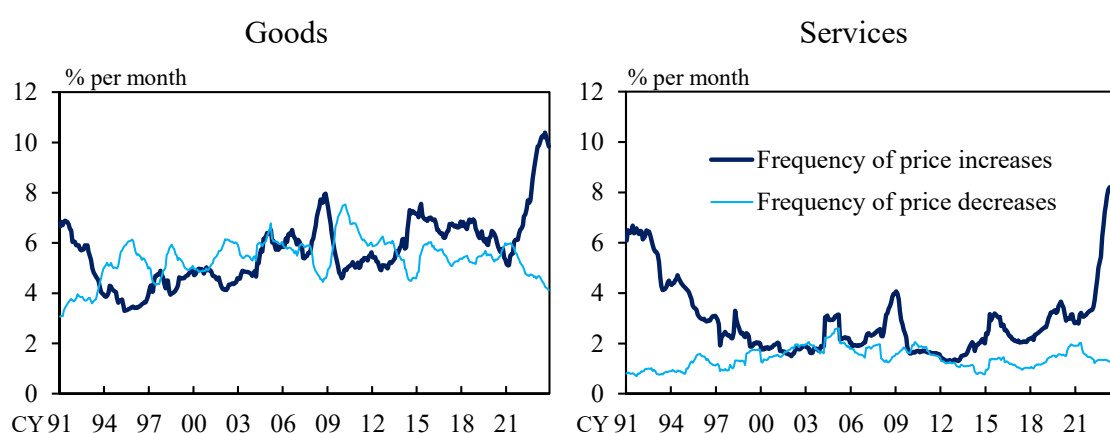
Source: Ministry of Internal Affairs and Communications.

Next, we will look at the frequency of price changes, which is an important measure of price rigidity (Figure 14). While the frequencies of price increases and decreases for goods were inversely correlated at about the same level, there was a large divergence

<sup>23</sup> It has been pointed out that the rate of increase in rent may be underestimated due to issues regarding the measurement in the CPI.

between the frequencies of increases and decreases for services (excluding rent) in the 1990s: while the frequency of price increases declined significantly, the frequency of price decreases rose only slightly and remained at a low level. The background to this downward rigidity of services prices in the 1990s was not necessarily clear,<sup>24</sup> but it prevented a sharp decline in prices and increased the share of zero-inflation items. After that, in the process of declining share of zero-inflation items in recent years, the frequency of price increases for both goods and services rose rapidly, while the frequency of price decreases remained relatively stable.<sup>25</sup>

(Figure 14) Frequency of Price Revisions



Note: Data are calculated based on the proportion of cities where the average price of individual items changed from the previous month (12-month backward moving averages). Data exclude fresh food, electricity, manufactured and piped gas, water charges, and housing rent. Temporary price changes due to, for example, consumption tax hikes and special sales are not incorporated. The latest data are as of November 2023.

Source: Ministry of Internal Affairs and Communications.

Based on the above basic facts from micro data, we present the results of estimating the costs associated with price changes (menu costs) and the strength of firms' practices of keeping prices unchanged through strategic complementarity as mentioned in Section 3, using a dynamic model that formulates firms' profit maximization and state-dependent pricing.<sup>26</sup> Note that the menu cost assumed here is a concept that includes not only the

<sup>24</sup> Downward rigidity in services prices may be related to downward rigidity in nominal wages (Higo and Saita 2007). It has been pointed out that downward rigidity of nominal wages during a recession may induce upward rigidity during the subsequent recovery period (Hirata, Maruyama, and Mineyama 2020). A survey of large firms conducted by the Bank of Japan's Research and Statistics Department in 2000 suggested that the price-setting strategy that places importance on capturing market share even with lower prices that had been observed in earlier years might have receded, and that price rigidity might have strengthened as firms placed more emphasis on securing profits (Bank of Japan, Research and Statistics Department 2000a, 2000b)

<sup>25</sup> The size of price changes has generally been stable compared with the frequency of price changes, but in the recent period the size of increases in goods prices has been rising.

<sup>26</sup> See Furukawa et al. (2024) for details of the analysis.

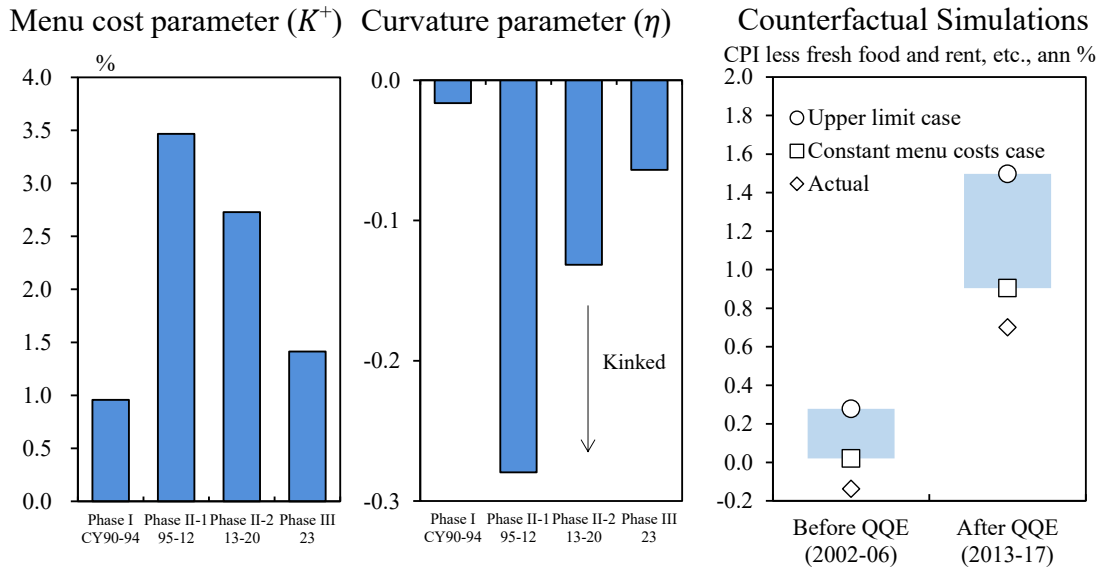
physical cost of changing price tags, but also the indirect costs associated with information gathering, decision making, and internal communication, as well as communication and negotiation with customers. Therefore, frequent price changes or price changes for many items at the same time can save such indirect costs (Conversely, if price changes are not made for a long period of time, these indirect costs may increase due to reasons such as a loss of know-how). In addition, the strength of firms' practices of keeping prices unchanged, estimated here, corresponds to the degree to which the price elasticity of demand faced by firms depends on the relationship with the prices set by other firms. Specifically, this is represented by the degree of kinkedness (curvature) of households' (quasi-kinked) demand curve, in which a large amount of demand is lost when prices are raised relative to other firms (but only a small amount of demand is induced when relative prices are lowered). Focusing on service prices, where rigidity was particularly strong, and taking into account past trends in price changes and so on, the estimated menu costs and the kinkedness of demand curve were larger during the deflationary period since the late 1990s and then became smaller after the 2010s. Most recently, in 2023, they have declined to a level close to that of the early 1990s (Figure 15, left and middle panels). These results suggest that price rigidity and the practice of keeping prices unchanged through strategic complementarities among firms, which were observed during the deflation period, may have weakened considerably in recent periods.<sup>27</sup> A counterfactual simulation using a different static model<sup>28</sup> shows that if price rigidity due to menu costs and other factors had not increased after the late 1990s (i.e., had remained constant at the level of the mid-1990s), the inflation rate (year-on-year change in CPI, all items less fresh food, rent, etc.) could have been 0.2 to 0.8 percentage points higher than the actual inflation rate (Figure 15, right panel). This simulation result suggests that one of the reasons why the inflation rate did not rise much until the 2010s could have been the increased price rigidity.

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<sup>27</sup> During the recent high-inflation period, synchronized price increases through strategic complementarities have also been observed (Ikeda et al. 2023).

<sup>28</sup> The static model is based on the simplified model of Karadi and Reiff (2019), which interprets the parameter on the threshold of price changes as menu costs. The analysis considers menu costs for both goods and services prices, but the impact of the former on inflation is limited, with most of the estimated impact coming from services prices.

(Figure 15) Menu Costs and Quasi-Kinked Demand Curve



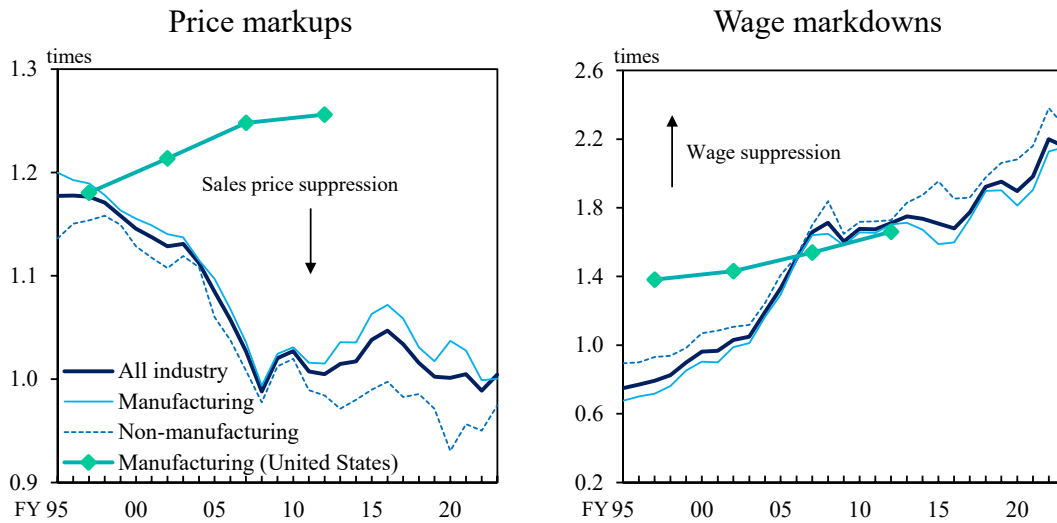
Note: The left and middle panels show the results for services from a dynamic model based on Nakamura and Steinsson (2008) with a quasi-kinked demand curve incorporated. A menu cost is defined as the ratio of cost that is incurred at firms when they increase prices to unit labor cost. "Kinkedness" is a parameter that defines the curvature of a quasi-kinked demand curve. The counterfactual simulations in the right panel is based on the static model by Karadi and Reiff (2019). "Constant menu costs case" assumes that the price change threshold is constant since the second half of the 1990s. "Upper limit case" takes into account the linkage between macroeconomic shocks and price change threshold.

Next, we show another analysis of firms' price-setting behavior, which is a simultaneous estimation of price markups (the gap between sales prices and marginal costs) and wage markdowns (the gap between the marginal revenue product of labor and nominal wages).<sup>29</sup> The former is determined by the degree of competition in the product market and the latter in the labor market, respectively. As firms increase their market power in their respective markets, both price markups and wage markdowns could expand (prices will relatively rise and wages will relatively fall), allowing them to increase profits. The estimation results show that price markups had continued to decline since the late 1990s, in contrast to the United States, and then have stabilized at a low level since the 2010s (Figure 16, left panel). On the other hand, wage markdowns have risen continuously since the late 1990s (Figure 16, right panel). Thus, Japanese firms have secured profits by expanding wage markdowns to compensate for the decline in price markups (the composite of the two roughly corresponds to the operating profit ratio or the inverse of the labor share). As a result, price markups and wage markdowns have exerted downward pressure on prices and wages, respectively, and they might have reinforced the norm that prices and wages are unlikely to rise. According to the analysis,

<sup>29</sup> See Aoki, Hogen, and Takatomi (2023) and Aoki et al. (2024) for details of the analysis. See Yeh, Macaluso, and Hershbein (2022) for the U.S. estimation results.

in manufacturing, a decline in Japan's share of global exports due to changes in the international competitive environment has worked as a force for exerting downward pressure on price markups. In non-manufacturing, the number of stores per capita was elevated, working as a force for enhancing the severity of price competition, and that exerted downward pressure on price markups. On the other hand, the expansion of wage markdowns is related to the declining trend in the labor union organization rate since the 1970s, as well as the rising trend in the ratio of part-time workers since the 1990s (above Figure 11, left panel), as discussed in Section 4-2. As described above, since the trends in price markups and wage markdowns are deeply related to the structure of the product and labor markets, respectively, it is unlikely that they will change rapidly. However, there have recently been signs of recovering price markups and plateauing wage markdowns. Regarding the latter, labor shortages and the plateauing trend in the part-time workers ratio, as pointed out earlier, may increase the bargaining power of workers and lead to a reduction in wage markdowns. It is also worth paying attention to the impact of recent changes in the international economic environment on price markups.

(Figure 16) Price Markups and Wage Markdowns



Note: Price markups and wage markdowns are estimated based on Aoki, Hogen, and Takatomi (2023). Results for U.S. manufacturing are calculated using Yeh, Macaluso, and Hershbein (2022). Data for fiscal 2023 are those from April to December 2023. Sources: Cabinet Office; DBJ; Ministry of Finance; RIETI; Yeh, Macaluso, and Hershbein (2022).

To conclude this subsection, we summarize whether the norm that wages and prices are unlikely to rise is set to dissolve, based on the various mechanisms we have discussed so far. First, with the actual inflation rate continuing to exceed 2 percent, the medium- to long-term inflation expectations, especially among firms, have continued to rise (above Figure 3, middle panel) through the adaptive expectations mechanism. Next, as shown in the above analysis, the price rigidity and the practices of keeping prices unchanged

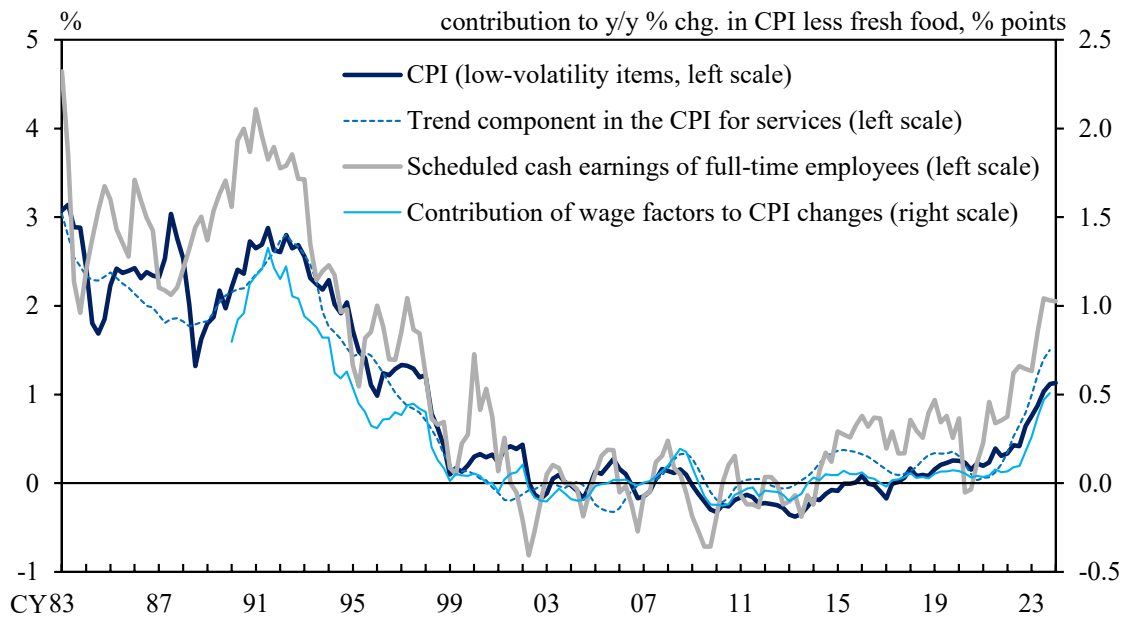
through strategic complementarities among firms, which had strengthened in the deflation period, may have weakened considerably in recent years. The downward rigidity in service prices observed in the 1990s might have delayed the subsequent upward adjustment of prices as well, but recently, the frequencies of price increases for both goods and services have risen rapidly to a level exceeding those of the 1990s, which implies that the difficulty of raising prices has eased (although the difficulty of lowering prices may still remain). As indicated in the analysis of price markups and wage markdowns, the decline in the former and the expansion of the latter might have reinforced the difficulty of raising prices and wages, but recently, there have been signs of recovering price markups and plateauing wage markdowns, which could ease the downward pressure on prices and wages. With regard to nominal wages (especially the scheduled cash earnings of full-time workers), they are highly linked to service prices and prices of low-volatility items, and their rate of change remained near zero percent for a long time from the end of the 1990s to the beginning of the 2020s (Figure 17). In recent years, however, they have finally turned clearly positive in response to the realization of base pay increases, intensifying labor shortages, and structural changes in the labor market, which imply that the norm on wages is also set to dissolve along with those of prices.<sup>30</sup> Finally, price increases themselves might have become socially difficult in terms of "fairness" concerns under the prolonged deflation and sluggish aggregate demand,<sup>31</sup> but with a substantial rise in energy prices in recent years, which is somewhat a "fair" factor, such norm has also been set to dissolve, at least for the time being.

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<sup>30</sup> Ozaki et al. (2024) use a number of different approaches to quantitatively measure the linkage between wages and prices. Among these, Ueno (2024) uses a dynamic factor model of disaggregated wages and prices and shows that the trend component of services price inflation is the best indicator to gauge the underlying trend in price inflation.

<sup>31</sup> As a norm for price setting, Okun (1981) and others pointed out the importance of price increases being perceived as "fair" by customers and other stakeholders (e.g., passing on costs to prices is fair, but changing prices in response to temporary changes in demand is not considered fair).

(Figure 17) Linkage between Wages and Prices



Notes: 1. Data for low-volatility CPI items and scheduled cash earnings of full-time employees are year-on-year percentage changes, while those for the trend component of the CPI for services are the 6-quarter backward moving averages of annualized quarter-on-quarter percentage changes.  
 2. Data for scheduled cash earnings of full-time employees before 1994 are those for regular employees. Moreover, data from 2016 onward are based on continuing observations following the sample revisions.  
 3. Data for the contribution of wage factors to CPI changes are based on the relationship between the CPI and wages, estimated using a 4-variable VAR model comprising import prices (yen basis), the output gap, wages (scheduled cash earnings of full-time employees), and price indices for low-, medium-, and high-volatility items in the CPI. The estimates are obtained using 20-year rolling regressions for low-, medium-, and high-volatility CPI items.  
 4. Data for the trend component of the CPI for services are the composite of the sector-specific price trend for services and the common trend in services prices and wages. They are estimated using category-level services prices and industry-level scheduled cash earnings. See Ueno (2024) for details.  
 5. The latest data for CPI (low-volatility items) and scheduled cash earnings of full-time employees are as of 2024/Q1, and those for trend component of the CPI for services and contribution of wage factors to CPI changes are as of 2023/Q4.  
 Sources: Ministry of Internal Affairs and Communications; Ministry of Health, Labour and Welfare; Ozaki et al. (2024); Ueno (2024); Bank of Japan.

#### 4-4. Other Signs of Change

So far in this section, in order to explore the background to the prospects that the price stability target will be achieved in a sustainable and stable manner, we have discussed various signs of change in recent years, focusing on the global economic landscape, labor markets, and firms' price-setting behavior. Other signs of change are discussed below.

An important sign of change in the corporate sector (apart from price-setting behavior) is the reallocation of resources among firms, as more and more firms engage in M&A and business successions triggered by labor shortages and other factors. As mentioned in Section 3, stagnant resource reallocation among firms has long been pointed out as one of the factors behind sluggish productivity, and in particular, Japan has been characterized by a significantly lower business opening and closing rates than in the United States and



Europe. While there has been no significant change in this situation, it has been pointed out that the reallocation of resources from exiting firms to surviving firms in recent years due to M&As and business successions may be contributing to a certain degree to boosting the macro-level productivity growth.<sup>32</sup> In addition, startup funding for emerging firms aiming to grow rapidly in a short period of time has been recently increasing in Japan, although still smaller in scale than in the United States and Europe. It is expected to lead to higher productivity and stimulate product innovation.<sup>33</sup>

Signs of recent change in corporate capital investment include not only labor-saving investment in response to labor shortages mentioned in Section 4-2, but also investment in digital transformation (DX), the need for which has become more strongly recognized after the pandemic, and in green transformation (GX) or addressing climate change, for which global efforts are making progress. On the other hand, recent labor shortages (rising wages) and sharp rises in material and energy prices have pushed up the prices of investment goods, which may constrain investment activities themselves. Looking back over time, the relative prices of investment goods to consumption goods had been on a downward trend until around the mid-2000s, reflecting the relatively rapid technological progress in the investment-goods sector (investment-specific technological progress), but then leveled off and have recently begun to rise slightly (Figure 18, left panel). In a related analysis, to what extent the factors specific to individual industries and those common to all industries contributed to the long-run economic growth trend are estimated, taking into account the multi-industry network of production and investment. The results show that the contribution of factors specific to the machinery industry, which has a large spillover effect on other industries, has been continuously declining since the mid-2000s, pushing down the growth trend (Figure 18, right panel).<sup>34</sup> It is worth paying attention to whether the investment-goods sector will regain its role as a driving force of Japan's economy as in the past.

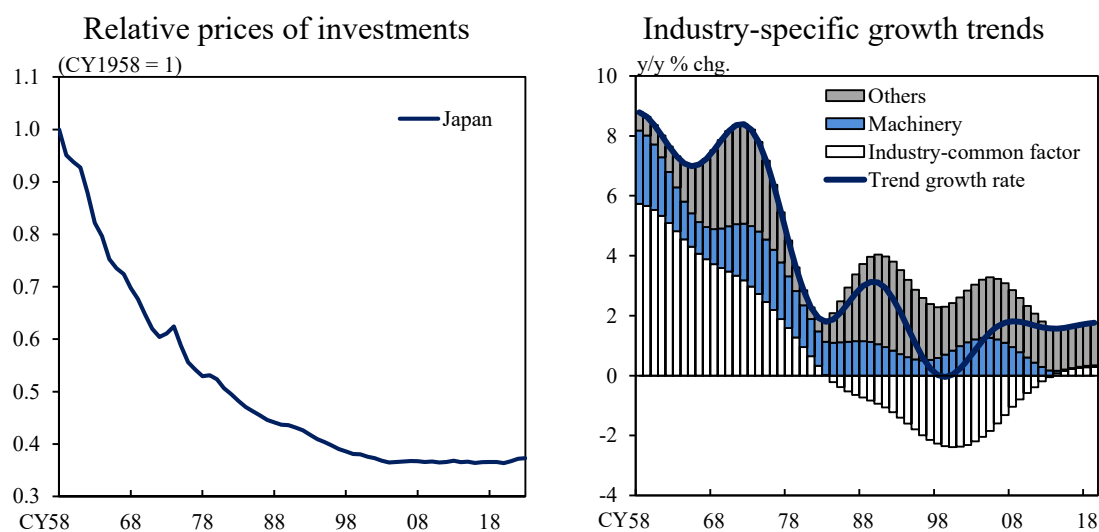
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<sup>32</sup> Takizawa and Miyakawa (2022) show that the contribution of resource reallocation among firms to the macro-level productivity improves over the post-pandemic period to 2022, using firm-level data.

<sup>33</sup> Itai et al. (2024) discuss recent positive trends among startups in Japan and challenges for future development, while also introducing the current situation and initiatives for development of startups in regional Japan.

<sup>34</sup> For details, see Shirota and Tsuchida (2024). The analysis also shows that the contribution of the durable goods industry to the growth trend in the United States has been declining since the mid-2000s as in Japan, and that the contribution of factors common to all industries is small (the contribution of factors specific to individual industries is large) in the United States, unlike in Japan.

(Figure 18) Relative Price of Investments and Industry-specific Growth Trends



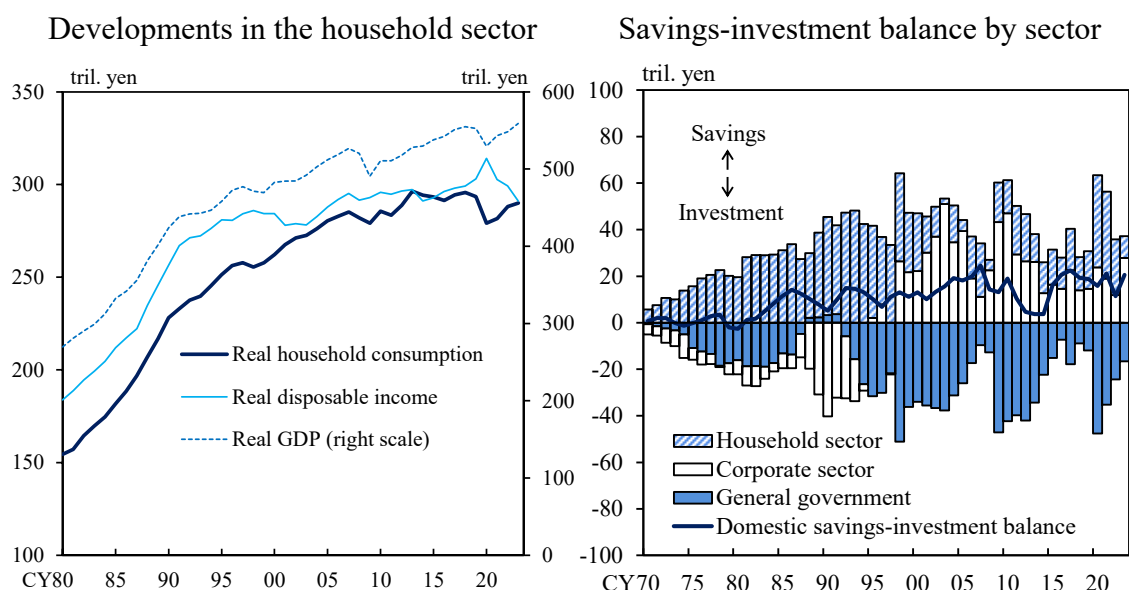
Note: The left panel shows the ratio between the private business fixed investment deflator and the private consumption deflator in GDP. The trend growth rate in the right panel is estimated by Shirota and Tsuchida (2024), based on the value-added by industry from the JIP database, aggregated and divided by the working-age population, with adjustments for demand shocks to extract the underlying trend. The growth rate does not match to the one in the SNA. The latest data are as of 2019.

Sources: Cabinet Office; Shirota and Tsuchida (2024).

Finally, there are some signs of change in the household sector in recent years, including a moderate recovery in real household consumption after having been constrained during the pandemic, and the increase of investment in stocks and other securities using the new tax exemption program for a small amount investment in the individual savings account (NISA), especially by the younger population. In the long run, however, households' real disposable income and real consumption have continued to weaken compared to real GDP, especially in recent years (Figure 19, left panel).<sup>35</sup> There has been no significant change in households' financial asset holding behavior with a large bias toward cash and deposits in comparison with the United States and Europe. Regarding the savings-investment balance by sector, the government sector continues to run a deficit (excess investment), while the household and corporate sectors continue to run a surplus (excess savings), resulting in a surplus in the total domestic sector (current account surplus), which has continued since the late 1990s (Figure 19, right panel).

<sup>35</sup> The stagnation in household income and consumption might have been influenced by the worsening terms of trade and the decline in the labor share, as mentioned in Sections 4-1 and 4-2. This point was discussed at the workshop (Bank of Japan 2024b).

(Figure 19) Household Sector and Savings-Investment Balance by Sector



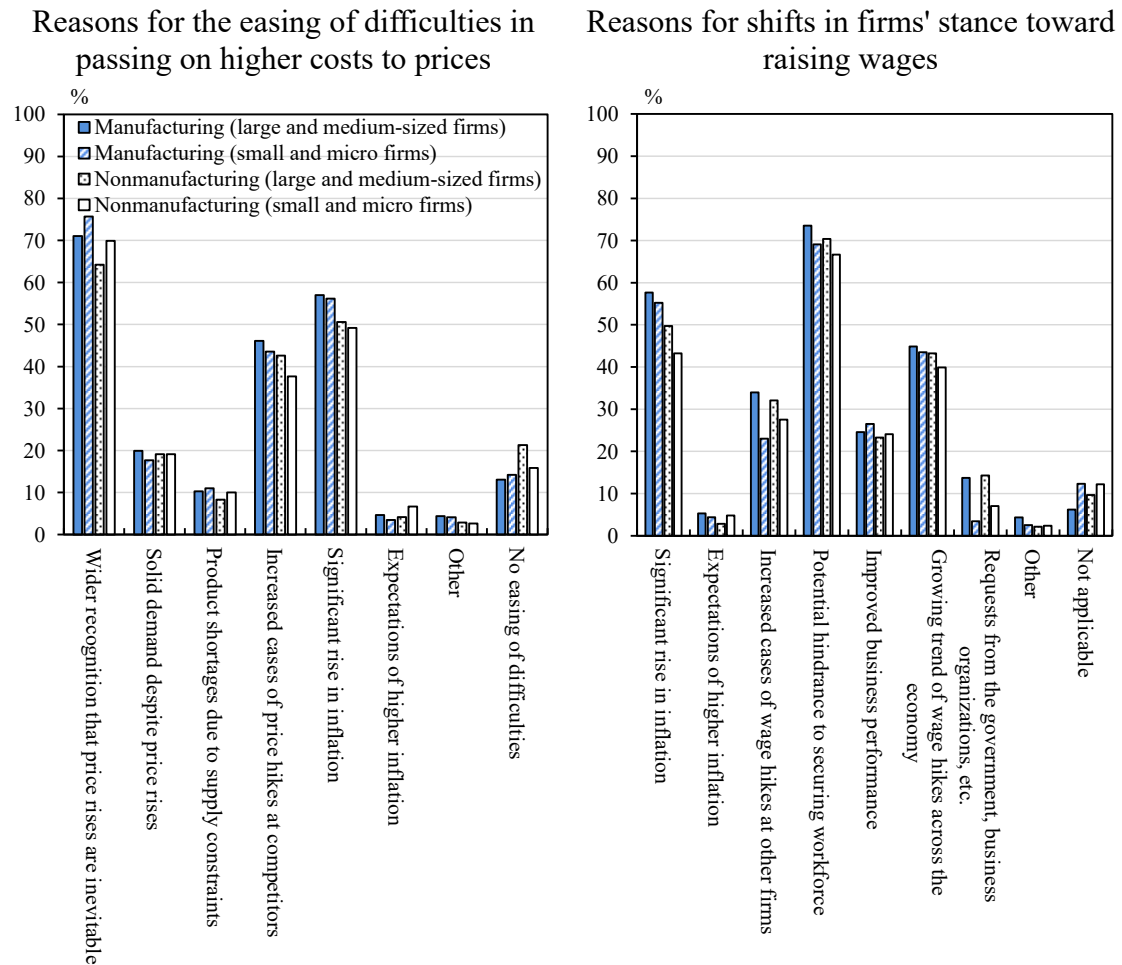
Note: Real disposable income is calculated using the deflator for household consumption. The latest data in both panels are as of 2023. Sources: Cabinet Office; Bank of Japan.

#### 4-5. Changes in the 2020s Based on Corporate Surveys

In Section 3, we summarized the results of the survey of corporate behavior covering the period up to the 2010s. Below we will summarize the results for the current phase (the past year or so) and check how the above discussion on the signs of change correspond to the survey results.

First, with regard to price setting, many firms recognized that the difficulty of passing on higher costs to prices was easing, and the reason most frequently cited was "wider recognition that price rises are inevitable" (Figure 20, left panel). This may be interpreted as the inevitability in terms of aforementioned "fairness" in the wake of the substantial rise in energy prices. In addition, many respondents also cited "significant rise in inflation" and "increased cases of price hikes at competitors," while few cited the factors more commonly assumed in the standard economic models such as "solid demand," "supply constraints," and "expectations of higher inflation." Whether price hikes reflecting an increase in personnel expenses as well as raw material costs were perceived as "inevitable" varied by industry, with many respondents saying (in interviews) that it was relatively difficult to pass on higher personnel expenses to prices.

(Figure 20) Results of the Survey regarding Corporate Behavior (Current Phase)



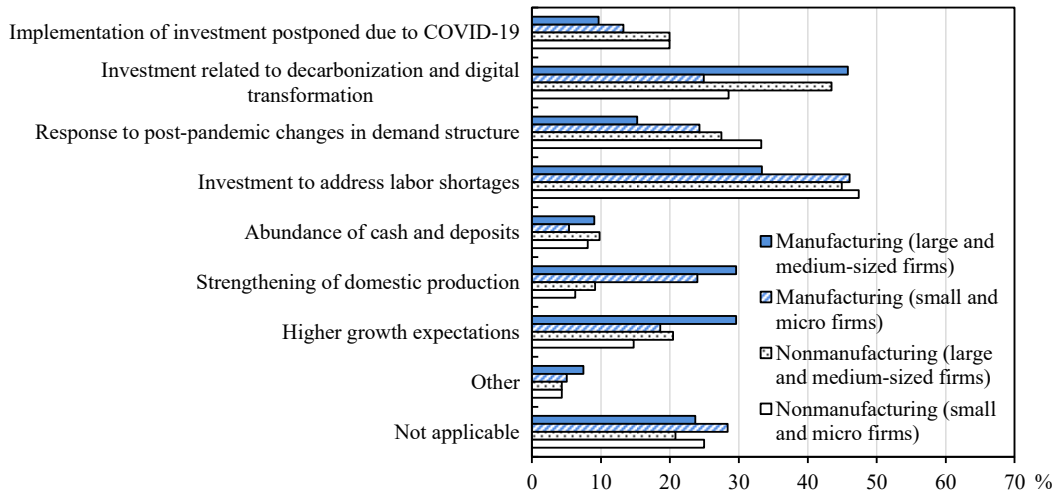
Note: The current phase is defined as the period over the past one year (the same applies hereafter). Up to three reasons were allowed. Source: Bank of Japan (2024a).

Next, regarding wage setting, a large majority of firms indicated that they were taking a more aggressive stance toward raising wages in the current phase, and the reason most frequently cited was "potential hindrance to securing workforce" (Figure 20, right panel). For the period up to the 2010s, as mentioned in Section 3, many respondents cited "ability to secure regular workers without wage hikes" as a reason for the sluggishness in base pay increases for regular workers, but the number of responses citing such a reason has decreased significantly for the current phase (above Figure 5, left panel), suggesting that some structural changes are happening such as the changes in the trend of labor supply and the increased labor mobility for regular workers, as mentioned in Section 4-2. Moreover, as also mentioned in Section 3, many firms cited "curbing personnel expenses" as a measure to address cost increases for the period up to the 2010s, but the number of responses citing this option has clearly declined for the current phase (above Figure 4, right panel), suggesting that the aforementioned wage markdowns may be narrowing.

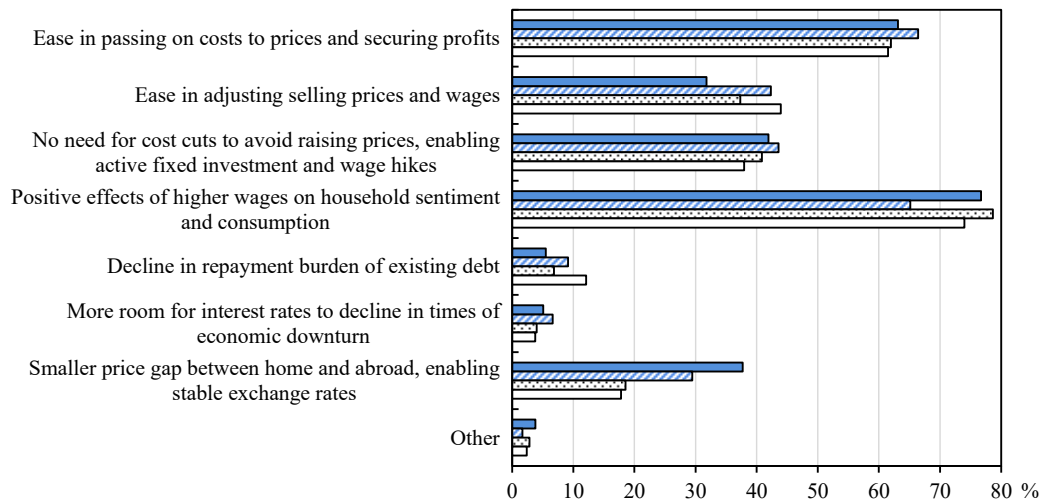
Finally, with regard to domestic business fixed investment, more than 70 percent of firms indicated that they had undertaken somewhat more active investment in the current phase than in the past. The reason most frequently cited was "investment to address labor shortages," and "investment related to decarbonization and digital transformation" was also frequently cited, especially by large firms (Figure 21, top panel). In addition, a number of firms in the manufacturing sector cited "strengthening of domestic production" against the backdrop of a retreat of globalization (shifting away from countries like China), and more non-manufacturers, compared to manufacturers, cited "response to post-pandemic changes in demand structure." In a separate question, a majority of firms responded that a state in which "prices and wages rise moderately" would be preferable for their business activities to a state in which "prices and wages hardly change," and as a reason for that, "no need for cost cuts to avoid raising prices, enabling active fixed investment" was cited frequently (Figure 21, bottom panel). This result suggests that the rises of prices and wages in the current phase themselves may also be a factor in more active investment.

(Figure 21) Results of the Survey regarding Corporate Behavior (Current Phase)

Reasons for undertaking more active domestic business fixed investment



Reasons for preferring a state in which prices and wages rise moderately



Note: In the upper panel, up to three reasons were allowed. The lower panel shows the shares of firms that responded that a state of "prices and wages rising moderately" is preferable to "prices and wages hardly changing." Of all respondents, about 80 percent of firms in the first phase and the second phase, and about 70 percent in the current phase are included. In this question, respondents were allowed to choose all applicable reasons.

Source: Bank of Japan (2024a).

5. Summary and Remaining Issues

This paper has provided an overview of economic activity and prices in Japan since the 1990s, based on discussions mainly in academia, the survey of corporate behavior, and the ongoing analyses conducted by the staff of the Research and Statistics Department of the Bank of Japan. After the pandemic in the 2020s, as the economic recovery and

tightening of labor markets as well as the surge in import prices have strengthened the virtuous cycle between wages and prices, it came in sight that the price stability target would be achieved in a sustainable and stable manner. Under these circumstances, people's mindset and practices based on the assumption that wages and prices are unlikely to rise, which took root during the deflation period, appear to be dissolving.

While we looked back on the past economic activity and prices in this paper as part of the "Broad Perspective Review," the effects of monetary policy on the economy and prices and its spillover mechanisms are currently being analyzed and assessed quantitatively in other papers in the Review. Therefore, this paper mentioned only the minimum necessary of previous studies and past discussions on those issues. In addition to monetary policy, there are many other issues that were not covered in this paper, including the assessment of past economic policies (such as fiscal policy and growth strategy), which may be crucial in reviewing Japan's economy and prices during the same period. Furthermore, the results of the analyses presented in this paper regarding the recent signs of change had to be a tentative assessment, given that the economic and price developments are still changing rapidly at this moment. Although these caveats should be kept in mind, it is interesting to see, based on the review in this paper, the long-term directions of the economy and prices in the future, including whether inflation expectations will be anchored at the 2 percent target and whether growth expectations will also rise through increased investment and higher productivity (see Appendix 2 for some discussion and analysis of the relationship between inflation expectations and growth expectations).

## Appendix 1: Deflationary Equilibrium

In this appendix, we briefly review the debate over the deflationary trap or "deflationary equilibrium" that was often referred to in academic circles in Japan and abroad from the 2000s to the 2010s (before and after the introduction of QQE). In this debate, some scholars pointed out the possibility of prolonged economic stagnation and deflation or self-fulfilling deflationary expectations if monetary policy is constrained to a lower bound on nominal interest rates while the potential growth rate and the natural rate of interest (equilibrium real interest rate) decline due to various factors.<sup>36</sup>

In the following, we will take as given the economic stagnation as expressed in the declining natural rate of interest and growth expectations,<sup>37</sup> and simplify the mechanism by which deflationary expectations become entrenched in a self-fulfilling manner. The two elements needed for the explanation are: (1) the definition of the real interest rate (the Fisher equation), which states that the real interest rate is the nominal interest rate minus inflation expectations, and (2) the reaction function of monetary policy (the Taylor rule), which states that a central bank sets the nominal interest rate in response to the deviation of the actual or expected inflation from the inflation target. In Appendix Figure 1 (both left and right panels), the two equations are depicted with the horizontal axis representing the actual or expected inflation and the vertical axis representing the nominal interest rate. The straight line represents the Fisher equation, which can be shifted up or down depending on the level of the real interest rate, and the intercept of the vertical axis corresponds to the level of the natural rate of interest determined by the long-term economic structure (assumed to be 0.5 percent in the solid straight line). The curved line represents a kind of the Taylor rule, which strongly raises the nominal interest rate (more than the marginal increase in inflation expectations so that the real interest rate moves in the same direction) when the actual or expected inflation exceeds the inflation target (2 percent) and, conversely, lowers the nominal interest rate when the inflation falls below 2 percent. However, when the nominal interest rate approaches a lower bound (assumed here to be zero), it cannot be lowered strongly, so the slope of the curve is flattened (completely flat at zero interest rate). The combination of a nominal interest rate and an

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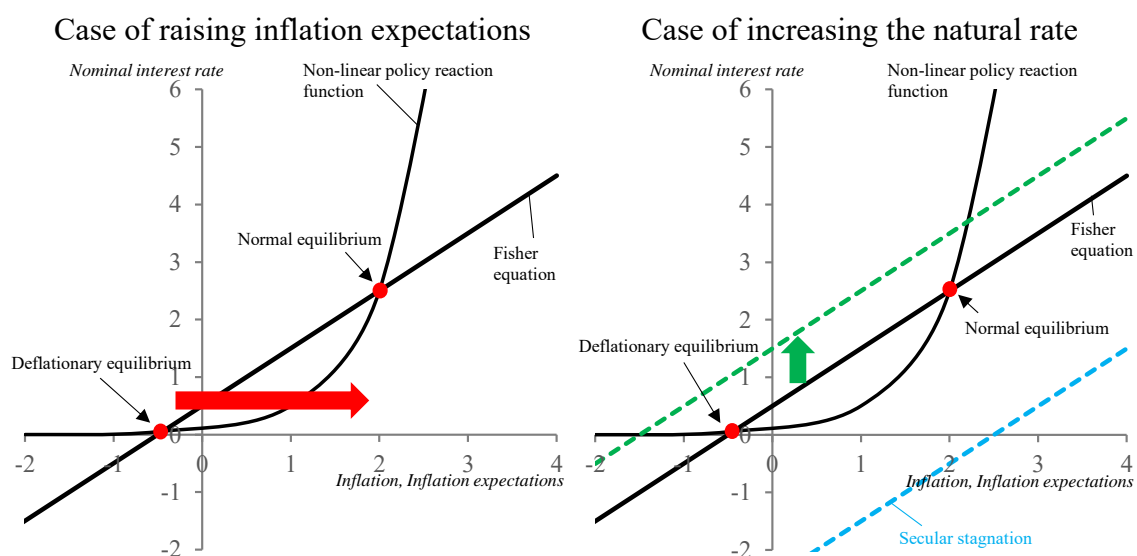
<sup>36</sup> Some of these arguments (e.g., Krugman 1998) assume a situation where the effectiveness of monetary policy is undermined by a lower bound on nominal interest rates in the event of a large (temporary) negative shock to the economy (liquidity trap), while others consider the possibility that deflationary expectations may become self-fulfilling at a lower bound on nominal interest rates (e.g., Benhabib, Schmitt-Grohé, and Uribe 2001). In this appendix, we mainly focus on the latter argument, following Bullard (2010).

<sup>37</sup> Some theoretical models consider the possibility that both sluggish growth expectations and deflationary expectations become entrenched in a self-fulfilling manner (Benigno and Fornaro 2018).



inflation rate that will be realized in the long run is determined by the intersection of the straight line and the curved line, and there are two possibilities shown in the figure. One is the case where the inflation target is achieved and a positive nominal interest rate is set (at 2.5 percent here), as indicated by the intersection on the right, and the other is the case where the inflation target cannot be achieved under the zero lower bound and deflationary expectations become self-fulfilling, as indicated by the intersection on the left.

(Appendix Figure 1) Directions to Break out of Deflationary Equilibrium



It was pointed out that Japan's economy in the 2000s might have been in a "deflationary equilibrium" as in the intersection on the left. There were roughly two possible directions in which macroeconomic policies could be used to break out of this situation: raising inflation expectations (moving in the right direction on the curve, Appendix Figure 1, left panel) or increasing the natural rate of interest (shifting the straight line upward, Appendix Figure 1, right panel).<sup>38</sup> As the former policy response, monetary policy, including unconventional measures (using tools other than the nominal interest rate), was considered to raise inflation expectations and lower the real interest rate (temporarily to

<sup>38</sup> To be precise, as shown in Benhabib, Schmitt-Grohé, and Uribe (2001), there exist an infinite number of equilibrium trajectories to the deflationary equilibrium (global indeterminacy), so breaking out of it may not be easy. In addition, an upward shift of the Fisher equation (straight line) reflecting an increase in the natural rate of interest may not eliminate the deflationary equilibrium: inflation expectations and growth expectations also need to increase in order to reach a normal equilibrium. On the other hand, as discussed in Bullard (2010), the deflationary equilibrium could be eliminated by adopting a monetary policy rule that sets a certain positive lower bound on the nominal interest rate or raises the interest rate when it approaches the deflationary equilibrium.

a level below the natural rate of interest), thereby stimulating the economy and pushing up prices. The latter direction was basically considered to be addressed through fiscal policy and growth strategies, but it was also pointed out that sustained monetary easing could lead to an increase in the natural rate of interest through the hysteresis effect. In the meantime, after the GFC, the possibility has been noted in many advanced economies that the natural rate of interest will continue to decline due to structural factors such as decreasing population and widening inequality (secular stagnation<sup>39</sup>), in which case monetary policy alone could no longer be expected to achieve the inflation target. If the natural rate of interest falls deeply into negative territory, the intersections of the curved and straight lines disappear (the blue dotted line in Appendix Figure 1, right panel).

We refrain from evaluating the extent to which Japan's experience of deflation and low inflation can be explained by the concept of deflationary equilibrium in this paper, but inflation expectations have continued to rise moderately toward 2 percent since the 2010s,<sup>40</sup> while it has been hard to evaluate the natural rate of interest because the estimated results vary widely depending on the method used.<sup>41</sup> (As a related issue, see Section 4-3 of the main text for an assessment of whether people's mindset and practices based on the assumption that wages and prices are unlikely to rise is set to dissolve.)

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<sup>39</sup> The hypothesis of secular stagnation was discussed a long time ago, but Summers (2013) revived it in recent years. Eggertsson, Mehrotra, and Robbins (2019) and others have formulated models and conducted quantitative analyses on this hypothesis.

<sup>40</sup> Osada and Nakazawa (2024) developed composite indicators of inflation expectations based on the term structure and forecasting power of individual measures, which indicates that medium- to long-term inflation expectations have risen moderately toward 2 percent in recent years.

<sup>41</sup> Nakano, Sugioka, and Yamamoto (2024) estimate the natural rate of interest in Japan using various methods and find that a downward trend continues in the long run, but the estimation results vary widely depending on the method used (minus 1.0 percent to plus 0.5 percent in the latest period).

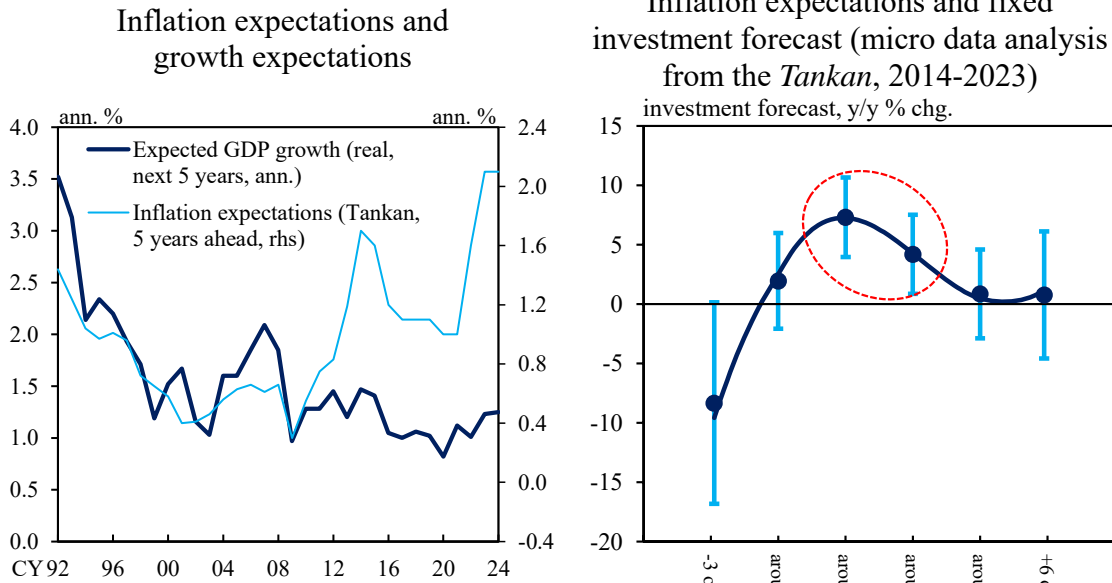
## **Appendix 2: Inflation Expectations and Growth Expectations**

This appendix discusses some issues and related analysis on the relationship between inflation expectations and growth expectations, which is important in considering the future directions of the economy and prices from a somewhat longer-term perspective.

In Japan, medium- to long-term inflation expectations and growth expectations both declined in the 1990s, and the two remained closely linked thereafter until the 2000s (Appendix Figure 2, left panel). In other countries, there have been cases where medium- to long-term inflation expectations have been anchored to the central bank's inflation target, making them less sensitive to changes in growth expectations, while in some cases rising inflation expectations above the central bank's target have led to falling growth expectations, but there have been few cases where the two have been linked in the same direction as in Japan. In the background to the positive relationship between inflation expectations and growth expectations in Japan, the following mechanisms might be at work: a large negative demand shock in the early 1990s might have a long-lasting impact on both the demand and supply sides with a hysteresis effect; uncertainty about the future due to the falling birthrate, aging population, and deteriorating public finances might push down the trends in economic growth and inflation; and the effect of monetary easing might have been lost under a lower bound on nominal interest rates, leading to a prolonged slump in the economy and prices. However, after QQE was introduced in the 2010s, inflation expectations rose somewhat even as growth expectations remained sluggish, and in the 2020s, firms' 5-year inflation expectations rose to above 2 percent (although inflation expectations of other agents have remained below 2 percent, see above Figure 3, middle panel, in the main text).

In the future, if medium- to long-term inflation expectations are anchored at 2 percent in Japan, as in other advanced economies, it is possible that they will continue to diverge from growth expectations. Alternatively, it may be possible that the two could become linked again by declining inflation expectations in response to sluggish growth expectations, or conversely, by recovering growth expectations in response to higher inflation expectations. These possibilities, like the above mechanisms that might have been at work until the 2000s, depend on a variety of factors, including the long-run effects of shocks on the demand and supply sides and the responses of fiscal and monetary policies, and therefore cannot be simply predicted. As a clue, the following analysis focuses on business fixed investment, which is a nodal point linking the demand and supply sides over the medium to long term.

(Appendix Figure 2) Inflation Expectations and Growth Expectations



Note: The expected GDP growth in the right panel is the "Forecast of Japan's real economic growth rate: Next 5 years (all industries)" from the *Annual Survey of Corporate Behavior*. Data points are plotted according to the survey year. The data for inflation expectations before 2013/Q4 are estimates from Nakajima (2023). The latest data in 2024 are as of 2024/Q1.  
Sources: Cabinet Office; Nakajima (2023); Bank of Japan.

Note: The estimation period is from March 2014 to December 2023 (frequency: quarterly). The vertical lines represent the 95 percent confidence intervals. The horizontal axis aggregates multiple responses.  
Source: Bank of Japan.

In the analysis, using microdata from the *Tankan* (Short-Term Economic Survey of Enterprises in Japan), each firm's fixed investment is regressed on the firm's inflation outlook as well as sales and various judgment survey items.<sup>42</sup> Specifically, the parameters  $\beta_j$  and  $\gamma_k$  in the equation below are estimated to minimize the squared sum of the error terms  $\epsilon_{it}$ , using the binscatter method by Cattaneo et al. (2024).

$$y_{it} = \sum_j \beta_j * 1_{x_{it} \in B_j} + \sum_k \gamma_k * w_{ikt} + \epsilon_{it}$$

$y_{it}$ : the year-on-year percent change in fixed investment by firm  $i$  as of  $t$

$x_{it}$ : the 3-years-ahead inflation outlook (general prices, annual percent rate change) by firm  $i$  as of  $t$

$1_{x_{it} \in B_j}$ : the variable that is 1 if  $x_{it}$  (above) is included in the segment  $B_j$  and 0 otherwise

<sup>42</sup> The *Tankan* data used for the estimation are each firm's fixed investment (forecast), inflation outlook (general prices, 3 years ahead), sales, and various judgment survey items (business conditions, production capacity, change in output prices, change in input prices, financial position, lending attitude of financial institutions, and change in interest rate on loans) from the March 2014 Survey to the December 2023 Survey. The total sample size is approximately 130,000. The conclusion of the analysis are qualitatively unchanged even if the data of (nominal) fixed investment are deflated using the business fixed investment deflator, etc.

$w_{ikt}$ : the  $k$ -th control variable (sales, judgment survey items, annual and quarterly dummy variables, and industry dummy variable) by firm  $i$  as of  $t$

$\epsilon_{it}$ : the error term

The estimated relationship between fixed investment and inflation outlook (Appendix Figure 2, right panel), after controlling the other explanatory variables, implies that firms that expect moderate inflation (up to about 2.5 percent) significantly increase their fixed investment (no such relationship is found at firms that expect high inflation or deflation).<sup>43</sup> In general, the relationship between firms' demand for fixed investment and inflation expectations depends on the response of monetary policy (whether or not the nominal interest rate is adjusted to counteract the impact of changes in inflation expectations on the real interest rate) and some other factors,<sup>44</sup> but under moderately accommodative financial conditions, firms that expect a small positive inflation rate may believe that it is easy to make positive investments, as suggested by the results of the corporate survey mentioned in Section 4-5. If that is the case, a gradual rise in inflation expectations could conceivably be linked to higher growth expectations.

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<sup>43</sup> Appendix Figure 2 (right panel) plots the estimated year-on-year percentage change in fixed investment on the vertical axis, for each segment of inflation outlook on the horizontal axis (divided into segments to aggregate multiple responses for ensuring the stability of the estimation results), along with 95 percent confidence intervals and a polynomial approximation using a nonlinear function, assuming that other explanatory variables take their mean values.

<sup>44</sup> Coibion, Gorodnichenko, and Ropele (2020) found that exogenously generated higher inflation expectations led firms to plan higher investment only when monetary policy was constrained by an effective lower bound on nominal interest rates, in their empirical analysis using Italian firms' survey data. Fukui, Gormsen, and Huber (2024) show theoretically that a positive shock to inflation expectations can increase real investment, by focusing on the fact that firms' nominal required returns to capital (discount rates) are sticky with respect to expected inflation.

## References

- Aoki, K., Y. Hogen, and K. Takatomi (2023) "Price Markups and Wage Setting Behavior of Japanese Firms," Bank of Japan Working Paper Series, 23-E-5.
- Aoki, K., Y. Hogen, Y. Ito, K. Kanai, and K. Takatomi (2024) "Determinants of Price Markups at Japanese Firms and Implications for Productivity," Bank of Japan Working Paper Series, 24-E-15.
- Aoki, M. and H. Yoshikawa (2007) *Reconstructing Macroeconomics: A Perspective from Statistical Physics and Combinatorial Stochastic Processes*, Cambridge University Press.
- 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)*, September 2016.
- Bank of Japan (2021) *Assessment for Further Effective and Sustainable Monetary Easing*, March 2021.
- Bank of Japan (2024a) "Results of the *Survey regarding Corporate Behavior since the Mid-1990s*: Economic Activity, Prices, and Monetary Policy over the Past 25 Years from Firms' Perspective," *Regional Economic Report (Annex)*, June 2024.
- Bank of Japan (2024b) "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,'" *BOJ Reports & Research Papers*, August 2024.
- Bank of Japan, Research and Statistics Department (2000a) "Price-Setting Behavior of Japanese Companies: The Results of 'Survey of Price-Setting Behavior of Japanese Companies' and Its Analysis," August 2000.
- Bank of Japan, Research and Statistics Department (2000b) "Price Developments in Japan: A Review Focusing on the 1990s," October 2000.
- Benhabib, J., S. Schmitt-Grohé, and M. Uribe (2001) "The Perils of Taylor Rules," *Journal of Economic Theory*, 96(1-2), 40-69.
- Benigno, G. and L. Fornaro (2018) "Stagnation Traps," *The Review of Economic Studies*, 85(3), 1425-1470.
- Bernanke, B., M. Gertler, and S. Gilchrist (1999) "The Financial Accelerator in a Quantitative Business Cycle Framework," in J. B. Taylor and M. Woodford (ed.), *Handbook of Macroeconomics*, 1C, Chapter 21, pages 1341-1393, Elsevier.

- Bullard, J. (2010) "Seven Faces of 'The Peril'," *Review*, Federal Reserve Bank of St. Louis, 92, 339-352.
- Caballero, R., T. Hoshi, and A. Kashyap (2008) "Zombie Lending and Depressed Restructuring in Japan," *American Economic Review*, 98(5), 1943-1977.
- Cattaneo, M. D., R. K. Crump, M. H. Farrell, and Y. Feng (2024) "On Binscatter," *American Economic Review*, 114(5), 1488-1514.
- Chikamatsu, K., S. Ikeda, and T. Yagi (2024) "Effects of Demographic Changes on Medium- to Long-Term Business Fixed Investment," *Bank of Japan Review*, 24-E-7.
- Coibion, O., Y. Gorodnichenko, and T. Ropele (2020) "Inflation Expectations and Firm Decisions: New Causal Evidence," *The Quarterly Journal of Economics*, 135(1), 165-219.
- Eggertsson, G., N. Mehrotra, and J. Robbins (2019) "A Model of Secular Stagnation: Theory and Quantitative Evaluation," *American Economic Journal: Macroeconomics*, 11(1), 1-48.
- Fukao, K. (2013) "Explaining Japan's Unproductive Two Decades," RIETI Policy Discussion Paper Series, 13-P-022, Research Institute of Economy, Trade and Industry.
- Fukui, M., N. J. Gormsen, and K. Huber (2024) "Sticky Discount Rates," NBER Working Paper 32238.
- Fukunaga, I., K. Furukawa, S. Haba, Y. Hogen, Y. Kido, T. Okubo, K. Suita, and K. Takatomi (2023) "Wage Developments in Japan: Four Key Issues for the Post-COVID-19 Wage Growth," *Bank of Japan Working Paper Series*, 23-E-4.
- Fukunaga, I., Y. Kido, and K. Suita (2024) "Japan's Inflation under Global Inflation Synchronization," *Bank of Japan Working Paper Series*, 24-E-4.
- Fukunaga, I., Y. Hogen, Y. Ito, K. Kanai, and S. Tsuchida (2024) "Potential Growth in Japan: Issues on Its Relationship with Prices and Wages," *Bank of Japan Working Paper Series*, 24-E-16.
- Furukawa, K., Y. Hogen, K. Otaka, and N. Sudo (2024) "On the Zero-Inflation Norm of Japanese Firms," *IMES Discussion Paper Series*, 2024-E-15.
- Furukawa, K., Y. Hogen, and Y. Kido (2023) "Labor Market of Regular Workers in Japan: A Perspective from Job Advertisement Data," *Bank of Japan Working Paper Series*, 23-E-7.

- Goodhart, C. and M. Pradhan (2020) *The Great Demographic Reversal: Ageing Societies, Waning Inequality, and an Inflation Revival*, Springer.
- Hayashi, F. and E. Prescott (2002) "The 1990s in Japan: A Lost Decade," *Review of Economic Dynamics*, 5(1), 206-235.
- Higo, M. and Y. Saita (2007) "Price Setting in Japan: Evidence from CPI Micro Data," Bank of Japan Working Paper Series, 07-E-20.
- Hirata, W., T. Maruyama, and T. 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, 20-E-4.
- Hogen, Y., Y. Ito, K. Kanai, and N. Kishi (2024) "Changes in the Global Economic Landscape and Issues for Japan's Economy," Bank of Japan Working Paper Series, 24-E-3.
- Hogen, Y. and N. Kishi (2024) "The Balassa-Samuelson Effect in Japan," Bank of Japan Working Paper Series, 24-E-22.
- Ikeda, S., H. Inatsugu, Y. Kishaba, T. Kondo, K. Sakura, K. Takatomi, T. Nakazawa, and K. Yamada (2022) "Inflation in Japan: Changes during the Pandemic and Issues for the Future," Bank of Japan Working Paper Series, 22-E-18.
- Ikeda, S., T. Kondo, Y. Kurachi, T. Matsuda, and T. Yagi (2023) "Firms' Recent Price-Setting Stance: Evidence from the *Tankan*," Bank of Japan Review, 23-E-2.
- Itai, Y., R. Maeno, A. Miyoshi, and A. Nishino (2024) "Environment for Startups in Japan and Initiatives in the Regional Japan," Bank of Japan Review, 24-E-5.
- Ito, T. and T. Hoshi (2020) *The Japanese Economy, Second Edition*, The MIT Press.
- Kaihatsu, S., M. Koga, T. Sakata, and N. Hara (2018) "Interaction between Business Cycles and Economic Growth," Bank of Japan Working Paper Series, 18-E-12.
- Karadi, P. and A. Reiff (2019) "Menu Costs, Aggregate Fluctuations, and Large Shocks," *American Economic Journal: Macroeconomics*, 11(3), 111-146.
- Kawamoto, T., T. Ozaki, N. Kato, and K. Maehashi (2017) "Methodology for Estimating Output Gap and Potential Growth Rate: An Update," *BOJ Reports & Research Papers*, Bank of Japan, May 2017.
- Kiyotaki, N. and J. Moore (1997) "Credit Cycles," *Journal of Political Economy*, 105(2), 211-248.



- Krugman, P. R. (1998) "It's Baaack: Japan's Slump and the Return of the Liquidity Trap," *Brookings Papers on Economic Activity*, 29(2), 137-187.
- Makabe, Y. and T. Yagi (2024) "Firms' Interest Payment Burden and Productivity under a Low Interest Rate Environment," Bank of Japan Working Paper Series, 24-E-20.
- Nakajima, J. (2023) "Estimation of firms' inflation expectations using the survey DI," Discussion Paper Series A.749, Institute of Economic Research, Hitotsubashi University.
- Nakamura, E. and J. Steinsson (2008) "Five Facts about Prices: A Reevaluation of Menu Cost Models," *The Quarterly Journal of Economics*, 123(4), 1415-1464.
- Nakamura, K., K. Kaihatsu, and T. Yagi (2019) "Productivity Improvement and Economic Growth: Lessons from Japan," *Economic Analysis and Policy*, 62(C), 57-79.
- Nakamura, K., S. Nakano, M. Osada, and H. Yamamoto (2024) "What Caused the Pandemic-Era Inflation?: Application of the Bernanke-Blanchard Model to Japan," Bank of Japan Working Paper Series, 24-E-1.
- Nakano, S., Y. Sugioka, and H. Yamamoto (2024) "Recent Developments in Measuring the Natural Rate of Interest," Bank of Japan Working Paper Series, 24-E-12.
- Nishizaki, K., T. Sekine, and Y. Ueno (2014) "Chronic Deflation in Japan," *Asian Economic Policy Review*, 9(1), 20-39.
- Okun, A. M. (1981) *Prices and Quantities: A Macroeconomic Analysis*, Brookings.
- Ozaki, T., M. Jimbo, T. Yagi, and A. Yoshii (2024) "Recent Developments in the Linkage between Wages and Prices," Bank of Japan Review, 24-E-2.
- Osada, M. and T. Nakazawa (2024) "Assessing Measures of Inflation Expectations: A Term Structure and Forecasting Power Perspective," Bank of Japan Review, 24-E-4.
- Shirota, T., and S. Tsuchida (2024) "Aggregate Implications of Changing Industrial Trends in Japan," Bank of Japan Working Paper Series, 24-E-2.
- Summers, L. (2013) Remarks at the IMF Fourteenth Annual Research Conference in Honor of Stanley Fischer.
- Takizawa, M. and D. Miyakawa (2022) "Pandemic and Productivity in Japan," Presentation in the ESRI International Conference 2022 (December 15, 2022), Economic and Social Research Institute, Cabinet Office of Japan.

- Ueno, Y. (2024) "Linkage between Wage and Price Inflation in Japan," Bank of Japan Working Paper Series, 24-E-7.
- Yagi, T., K. Furukawa, and J. Nakajima (2022) "Productivity Trends in Japan — Reviewing Recent Facts and the Prospects for the Post-COVID-19 Era —," Bank of Japan Working Paper Series, 22-E-10.
- Yeh, C., C. Macaluso, and B. Hershbein (2022) "Monopsony in the US Labor Market," *American Economic Review*, 112(7), 2099-2138.
- Yellen, J. (2016) "Macroeconomic Research After the Crisis," Speech at the 60th Annual Economic Conference sponsored by the Federal Reserve Bank of Boston.