

Japanese Households' Inflation Perceptions: The Formation Process and Their Relationship with Inflation Expectations

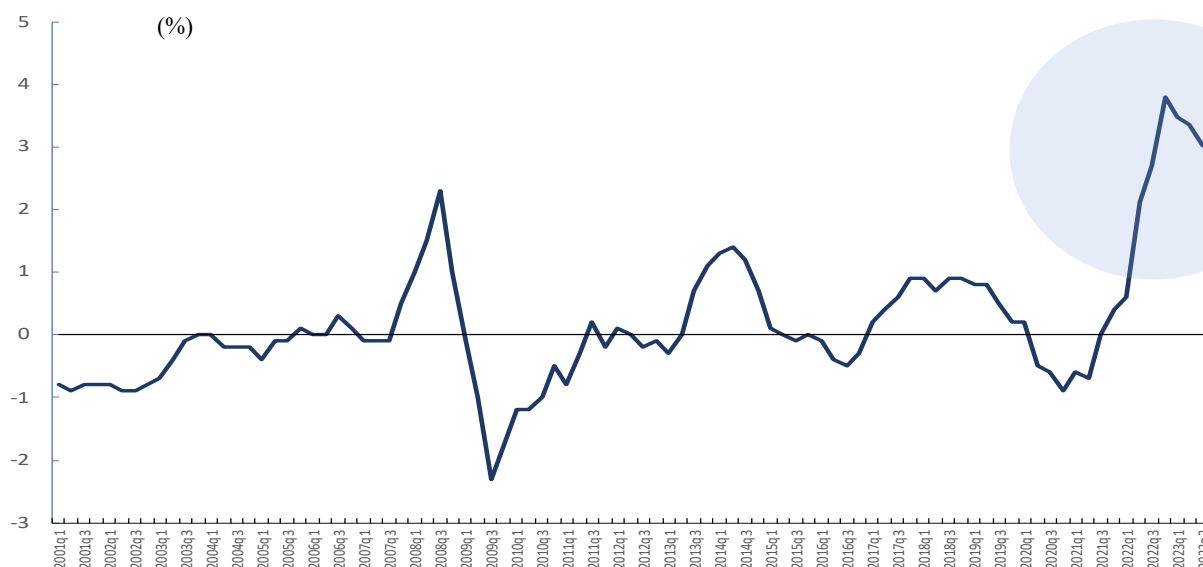
This study examined the formation process of household inflation perceptions as well as their relationship with inflation expectations and implications for monetary policy implementation. Inflation perceptions attracted relatively little attention until recently because they had constantly exceeded the actual CPI and were considered unreliable. This attitude has changed as inflation perceptions became considered the basis for forming inflation expectations. At the same time, the following reasons are offered to account for the inflation perceptions constantly exceeding the CPI. The first is a lack of households' basic knowledge regarding the CPI. The second is people's tendency toward loss aversion. The third is households' lack of awareness of the CPI's quality adjustments. Regarding the relationship between inflation perceptions and expectations, the following evidence was found. First, socio-economic attributes of consumers affect both inflation perceptions and expectations in the same way. Second, according to household surveys, households heavily rely on inflation perceptions when responding to inflation expectations. Third, cross-sectional analysis using individual sample data shows strong correlations between the inflation expectations and perceptions. Such features of inflation perceptions have monetary policy implications. First, although food and gas prices are excluded from the "core-core CPI," they should be monitored closely. Second, differences in inflation expectations caused by socio-economic attributes distort efficient resource allocation. Third, households' financial literacy should be improved. Future challenges in this field include further data accumulation, which enables detailed studies on the formation process of inflation perceptions.

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1. Introduction

The Japanese economy has experienced a long period of low inflation. During this period, the Consumer Price Index (CPI), excluding perishables and the effects of increases in consumption tax, has hovered around the minus-2-to-plus-2-percent range. This low-inflation phase abruptly ended at the beginning of 2021, as the corporate sector began to pass on the jump in import goods prices to the prices of its own products. In January 2023, the CPI peaked at + 4.1 percent on a year-on-year basis and remained high at +2.8 percent as of October 2023 (Figure 1).

(Figure 1) CPI (excluding perishables and the increase in the consumption rate)



(Source) Statistics Bureau of Japan

Such increases in the inflation rate have caused various economic problems in Japan while providing a unique opportunity to analyze households' inflation perceptions and expectations.

The Infotainment Research Center published a study in December 2023 titled “Instability of Japanese Households’ Inflation Expectations During the Current Inflationary Phase” (December Study). The study highlighted two findings. First, Japanese households’ inflation expectations significantly overshoot the CPI increase rates (CPI: +2.9 percent; one-year-ahead inflation expectation: +10 percent; five-years-ahead

inflation expectations: +5 percent).¹ Second, even though the U.S. and European CPI increased to around +10 percent, their one-year-ahead expectations remained at a maximum of +5 to 6 percent, and the five-years-ahead inflation stayed at +3 to 4 percent. The study concludes from the above evidence that Japanese households' inflation expectations are more unstable than those in the U.S. and Europe.

The December Study also showed that the movement of inflation expectations has been closely related to inflation perception, which is households' view of current price development. Based on the December Study, this study examines the formation process of inflation perceptions. Simultaneously, the relationship between inflation perceptions and expectations and the implications for monetary policy implementation are discussed.

The main results of this study showed that inflation perceptions have attracted relatively little attention because they constantly exceed the actual CPI and are considered unreliable. However, their information value has recently become highly appreciated, as inflation perceptions have been considered the basis for forming inflation expectations. In this process, the following explanations are offered for inflation perceptions constantly exceeding the CPI.

The first is the lack of basic household knowledge of the CPI. Households rely on the prices of frequently purchased goods such as food and gas as the most reliable sources of inflation perceptions. The synthesized CPI, consisting of food and gas prices, fits more closely with inflation perceptions than the overall CPI.

Second, people have a tendency toward loss aversion. People are said to be 2.5 times more sensitive to price increases, which lead to a loss in purchasing power, than price decreases. Therefore, price increases cause significant damage to consumer psychology and boost the perception of inflation above the actual CPI.

Third, there is a lack of awareness of households' CPI quality adjustments. Although such adjustments reduce the price index, consumers simply ignore them, leading to a wider divergence between the CPI and inflation perceptions.

Regarding the relationship between inflation perceptions and expectations, the following evidence was found. First, both inflation expectations and perceptions are affected in the same way by differences in consumers' social attributes, such as gender, income level, and academic background. Second, according to household surveys,

¹ As of September 2023.

households rely heavily on inflation perceptions when responding to inflation expectations. Third, a cross-sectional analysis using individual data revealed strong correlations between inflation expectations and perceptions.

These findings have implications for monetary policy implementation. First, although food and gas prices are excluded from the “core-core CPI,” their developments should be monitored closely as they are tightly related to the inflation perceptions. Second, differences in inflation expectations due to socioeconomic attributes also affect real interest rates and resource allocation. Third, households’ financial literacy should be improved as financially literate persons actively gather macroeconomic information, which, in turn, narrows the divergence between the CPI and inflation perceptions.

Because research on inflation perceptions remains scarce, future challenges in this field include further data accumulation, which enables studies on the formation process of inflation perceptions and their relationship with inflation expectations.

The remainder of this paper is organized as follows. Section 2 presents the relationship between perceptions of inflation and expectations. Section 3 highlights the factors contributing to higher inflation perceptions than the CPI, including households’ lack of knowledge regarding the CPI, reliance on prices of frequently purchased goods, and the effect of CPI quality adjustments. Section 4 provides evidence of the close relationship between inflation expectations and perceptions. Section 5 discusses the implications of monetary policy implementation. Finally, section 6 concludes the study.

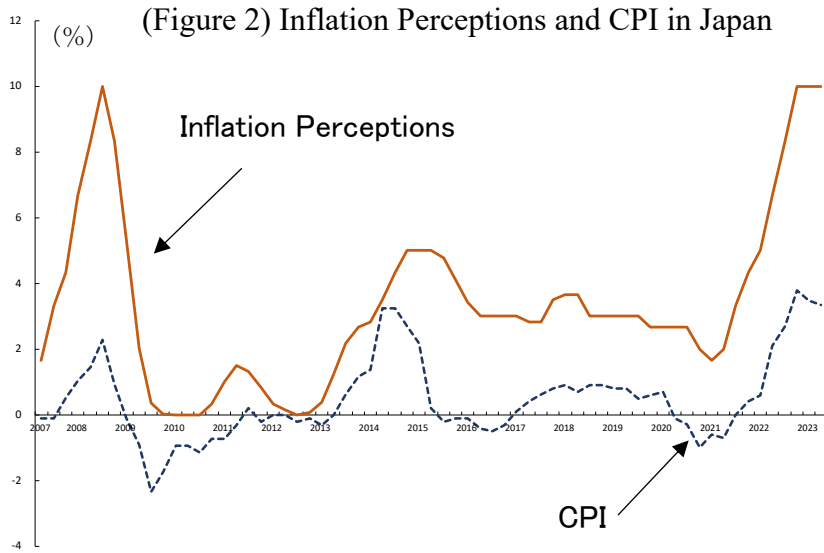
2. Inflation Perceptions Exceed Changes in CPI

2.1. Inflation Perceptions

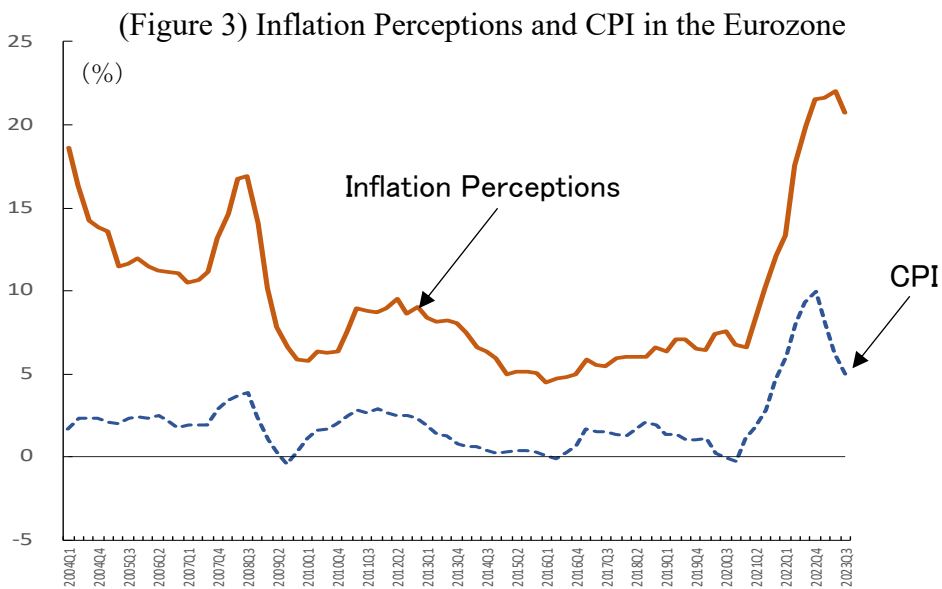
Figure 2 shows the relationship between inflation perceptions and the CPI in Japan. The features of the inflation perceptions are twofold. First, they consistently exceeded the CPI. The divergence amounts to approximately 2–4 percent, even before the current inflationary period. During the current inflationary phase, even though the peak CPI rate remained at +4.1 percent, inflation perceptions reached 10 percent. Second, they closely followed CPI movement. Third, even when the CPI decreased to negative values, inflation perceptions remained at zero percent.

Inflation perceptions exceed the CPI not only in Japan but also in other major developed countries, a phenomenon often called the “inflation perception conundrum”.

Figure 3 shows the Eurozone case. Although inflation perceptions closely follow CPI movement, their level is 5 to 10 percent higher than that of the CPI. Particularly during the current inflationary phase, inflation perceptions reached 20%, whereas the CPI remained at approximately 10 percent.



(Source) CPI from the Statistics Bureau of Japan, inflation perception from the Bank of Japan



(Source) HICP from the European Commission, inflation perceptions from the European Commission's Harmonized Consumer Survey.

2.2. The Relationship Between Inflation Perceptions and Expectations

Figure 4 illustrates the relationship between inflation perceptions and expectations in Japan. It illustrates several features. First, both variables move closely. Second, inflation expectations are more stable than inflation perceptions. Third, during the current inflation phase, inflation expectations increased almost as much as inflation perceptions. Fourth, inflation expectations seem to lead perception by three months.

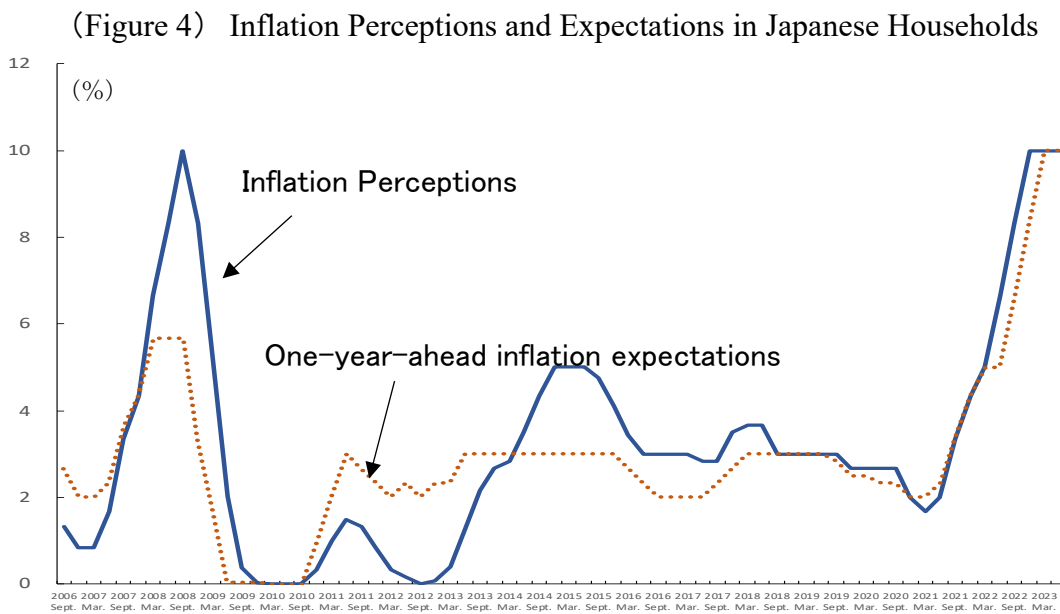
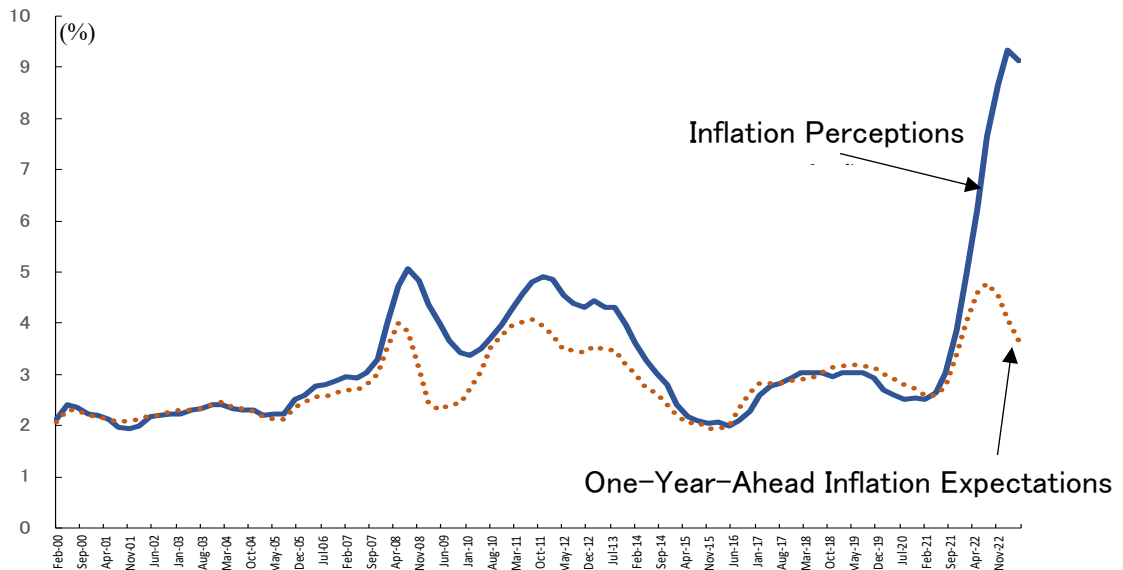


Figure 5 illustrates the situation in U.K. households. It also exhibited several features. First, inflation perceptions and expectations behave similarly. Second, except for the current inflationary phase, the levels of inflation perceptions and expectations are very close to each other. Third, unlike Japan, during the current inflation phase, inflation expectations remained below 5 percent, while perceptions increased to approximately 10 percent. Fourth, inflation expectations lead perception to a certain degree.

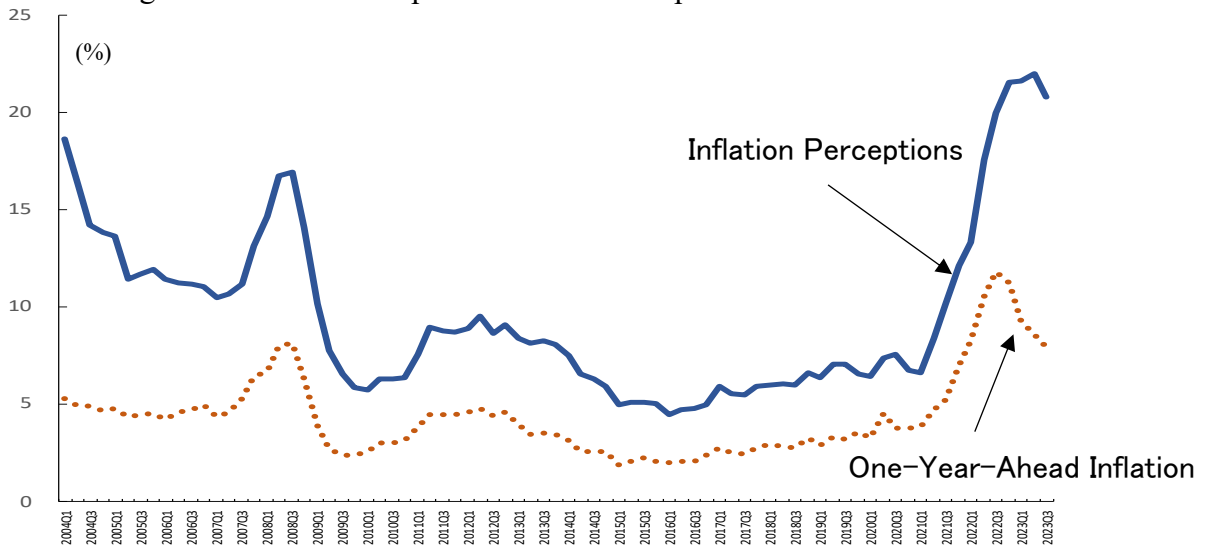
Next, Figure 6 shows the case of Eurozone households and shows four features. First, similar to households in Japan and the U.K., inflation perceptions and expectations behave similarly. Second, before the current inflation phase, the gap between expectations and perceptions was wider than in Japan and the U.K. Third, during the current inflation phase, the gap widened to more than 10 percent point. Fourth, inflation expectations seem to lead perceptions, as in the cases of Japan and the U.K.

(Figure 5) Inflation Expectations and Perceptions in U.K. Households



(Source) BOE “Inflation Attitude Survey”

(Figure 6) Inflation Expectations and Perceptions in the Eurozone



(Source) European Commission’s Harmonized Consumer Survey

Based on the above three examples, three conclusions can be drawn. First, the two variables moved closely together and followed the movement of the CPI. Second, inflation expectations show more moderate movements than do perceptions. Third, inflation expectations seem to lead perceptions to a certain degree. As the December

Study showed, Japanese households' inflation expectations are more unstable than those of the U.K. and the Eurozone.

Until recently, most economists in developed countries rarely paid attention to households' inflation perceptions as they are too high to “justify” or “impractical to use in economic analysis.” Therefore, studies on the gap between the CPI and inflation perceptions are scarce.

However, calculating the statistical relationship between inflation expectations and CPI/inflation perceptions revealed that inflation perceptions are much more closely correlated with expectations than the CPI. In Japan, the correlation between inflation perceptions and one-year-ahead inflation expectations is higher (0.84) than that between the CPI and expectations (0.77).²

Inflation expectations, on the other hand, are regarded as one of the important macroeconomic variables. Professional forecasts of inflation expectations, such as surveys of economists and people engaged in financial markets, or inflation expectations derived from yields on inflation-linked bonds are often used as typical inflation expectations rather than those of households. When the inflation expectations are adapted in macroeconomic models, they often assume rational expectations (people act according to the assumption that they know all of the information about the macroeconomic variables) or adaptive expectations (people rely on past inflation rates as a proxy for future inflation rates).

Nonetheless, as shown in Figures 4–6, inflation perceptions follow CPI movement, although the level and degree of fluctuation are somewhat different. Thus, economists have paid increasing attention to inflation perceptions since the early 2000s. In doing so, the first task was to uncover the reasons why inflation perceptions constantly exceed the CPI.

3. The Formation Process of the Households Inflation Perceptions

This section discusses the formation process of inflation perceptions, focusing on the fact that they constantly exceed the CPI. Inflation perceptions are affected by various factors such as consumers' purchasing patterns, information-gathering behavior, and knowledge of the economy. This section identifies five factors that affect inflation

² The sample period is from June 2007 to December 2023 and on a quarterly basis.

perceptions. The first is the price of frequently purchased goods. Second, we consider food and gas prices. The third is consumers' tendencies toward loss aversion, the fourth is the CPI's quality adjustment, and the fifth is individual experiences with inflation and deflation.

3.1. Correlation between inflation perceptions and the CPI

As Figure 2 shows, inflation perceptions move closely in relation to the CPI. Their correlation is high at 0.76 (observation period: June 2007 to September 2023 on a quarterly basis). In the U.K., the correlation is 0.90 (observation period: November 1999 to September 2003 on a quarterly basis). The Eurozone's correlation is 0.82 (observation period: March 2004 to September 2003 on a quarterly basis).³ In case of the U.S., for which the observation period is the longest among developed countries, the correlation between the CPI and inflation expectations using the University of Michigan Survey was 0.91 (observation period: January 1978 to September 2003 on a monthly basis).⁴

3.2. Households' Source of Information in Forming Inflation Perceptions

The above subsection describes the strong correlations between inflation perceptions and the CPIs in major developed countries. The next question is what type of information households rely on when responding to household surveys. First, we examine how knowledgeable households are regarding inflation. The "Financial Literacy Survey," conducted by the Central Council for Financial Service Information in Japan, contains basic questions on inflation.⁵ The first item is as follows:

"When inflation is high, overall price level, including that of necessities and service, will go up swiftly."

Respondents are given three choices: "correct," "incorrect," and "don't know." Survey results shows that 64 percent answered "correct," while 3 percent chose "incorrect" and 29 percent responded "don't know." Surprisingly, approximately 40 percent of respondents who chose "don't know" and "incorrect" do not understand the basic concept of inflation. Some argue that continued deflation in Japan may have affected these responses. The next question is more neutral.

³ ECB (2017).

⁴ As the Michigan University Survey does not cover inflation perceptions, inflation expectations were used as an alternative variable.

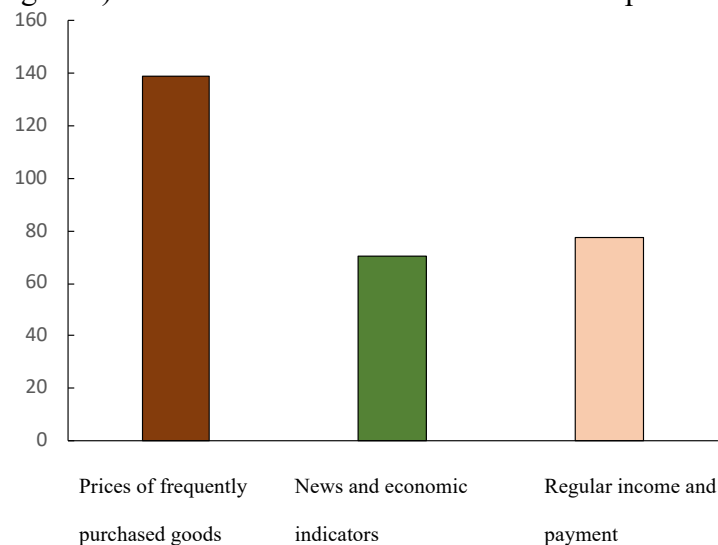
⁵ CCFSI (2022) Questions 21-1 and 22.

“If the inflation rate is 2 percent and you had a deposit interest rate of 1 percent, how much goods and service you can buy one year from now?”

Only 55% of the respondents answered this question correctly, while 11 percent chose the wrong answer, and 33 percent responded that they did not know the answer. As this question shows, about 40 percent of consumers (“incorrect” plus “don’t know”) lack a basic understanding about the inflation.

The responses to the two questions above suggest that at least 40 percent of consumers lack a basic understanding of inflation and its economic consequences. This implies that these households are incapable of understanding the role of the CPI or monitoring its actual value. In other words, consumers who can respond regarding inflation perception and expectations based on accurate information related to the CPI account for only 60 percent at most, a disappointment for economists.

(Figure 7) Information Sources for Inflation Perceptions



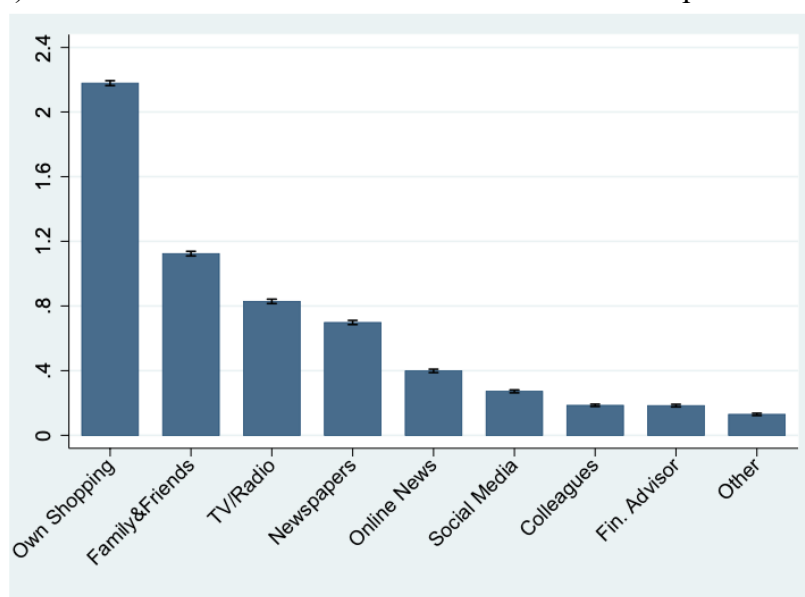
(Source) Bank of Japan (2013), Question 12; “Prices of frequently purchased goods” includes “gas prices” and “price development of respondents’ business activities”; “News and indicators” includes “news on price development,” “foreign exchange rates,” “stock and real estate prices,” and “the Bank of Japan’s monetary policy.” “Regular income and payment” includes “price development of goods and service purchased irregularly.” Respondents are permitted to choose three answers from 11 choices.

Next, the Bank of Japan’s “Opinion Survey,” conducted in September 2013, directly inquired into sources of information for inflation perceptions. Figure 7 presents the survey results. The most popular answer was “price development of frequently purchased goods,”

which included food and gas prices, followed by “information from TV news and newspapers” and “regular income and payment.” However, each share of the total response is less than half that of frequently purchased goods. Although this question allows multiple responses (up to three responses), approximately half of the respondents relied on the price of frequently purchased goods when asked about their inflation perceptions.

Similar surveys have been conducted in other developed countries; Figure 8 shows an example of a survey conducted in the U.S. The most popular responses when asked about the inflation expectations is “own shopping,” followed by “family and friends,” which is also related to daily shopping. Mass communications, such as TV, radio, and newspapers, follow, but their share is much lower than the top two.

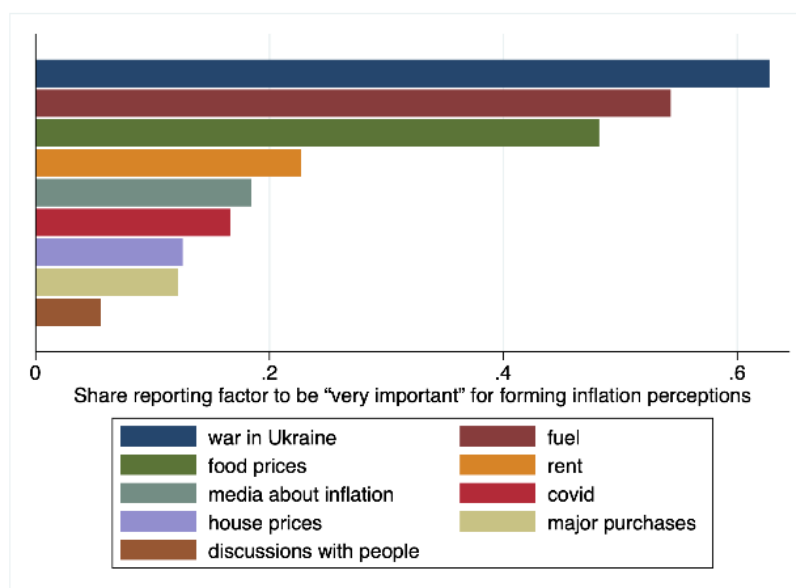
(Figure 8) Households’ Source of Reference for Inflation Expectations in the U.S.



(Source) D’ Ancuto et al. (2019) Figure 1

Figure 9 shows the results of a similar survey conducted in Germany. As the survey was conducted in 2023, the top choice was “war in Ukraine,” but the second choice was “fuel,” and the third was “food prices.” “Media about inflation” was fifth, and its share was only about the half that of food prices and gas prices.

(Figure 9) Source of Information When Forming Inflation Perceptions in Germany



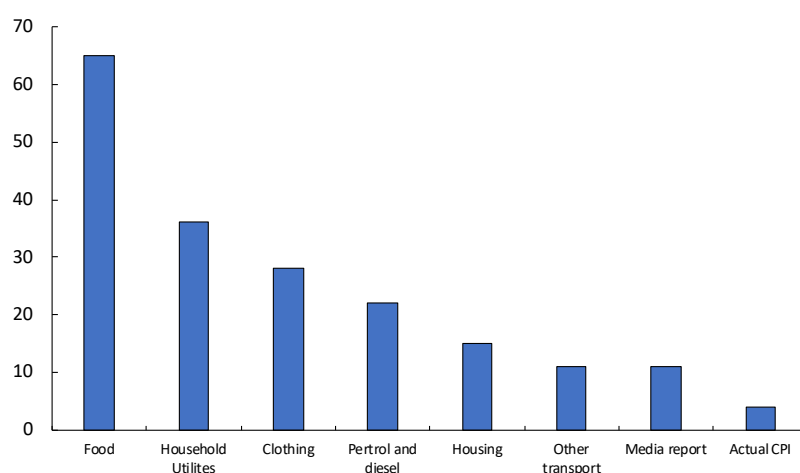
(Source) Deuche Bundes Bank (2023) Figure 3

An European Central Bank (ECB) study segregated consumers into “better performers” and “worse performers” depending on differences in the formation of inflation perceptions. The former are clever consumers who refer to objective information such as mass media reports when forming inflation perceptions. The latter are unwise consumers who depend on their own experiences, such as shopping and the price development of frequently purchased goods. In Japan, the share of “worse performers” seems to reach 40 to 50 percent, which may be a reason for the significant divergence between the CPI and inflation perceptions. A survey by the central bank of Germany showed that even though consumers knew about mass media reports regarding inflation, 89–92 percent of them still relied mainly on information acquired through their own shopping experience.⁶

Figure 10 shows the results of the U.K. survey conducted by the Bank of England (BOE). As in other countries, the first to sixth choices were related to the prices of frequently purchased goods. Media reports on inflation development and the actual CPI ranked seventh and last, respectively. In another survey, 45 percent of households that were asked about the CPI inflation rate answered “don’t know,” and only 10–20 percent answered correctly.

⁶ Deuche Bundes Bank (2023)

(Figure 10) Source of Information When Forming Inflation Perceptions in the U.K.



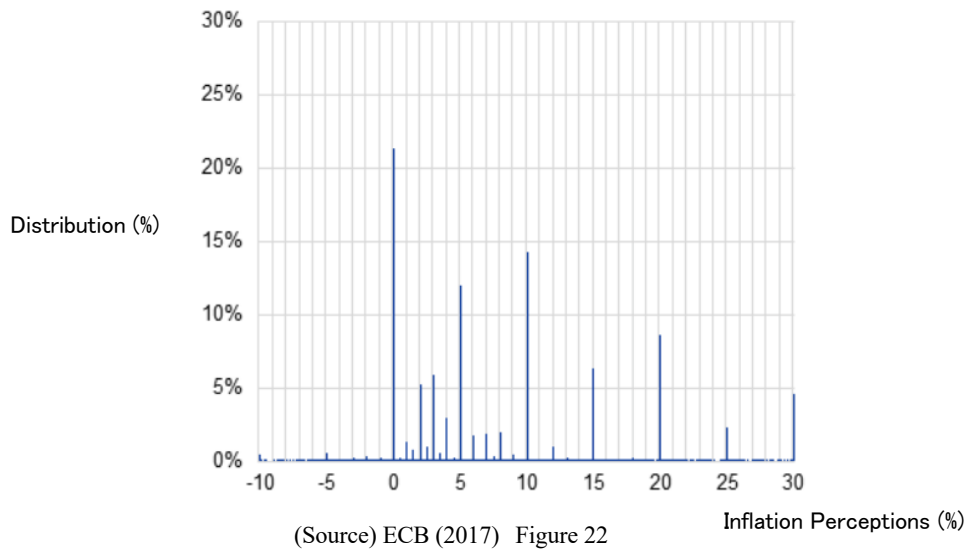
(Source) BOE (2016) Up to four reports allowed.

Figure 11 shows the distribution of inflation perceptions in the Eurozone⁷ and reflects several features. First, the responses are concentrated at multiples of five such as 0, 5, 10, 15, and 20. Second, even for the range between 0 and 5 percent, which is close to the actual CPI, responses are concentrated on integers such as 1, 2, and 3. Third, although extremely high responses (such as 30 percent) were observed to a certain degree, responses below zero were rare.

These findings align with “rounding responses,” a concept used in psychology, which often emerges when respondents are not confident with their own responses. Most of the “worse performers” may have given such responses.

⁷ Japanese household surveys showed the distribution of inflation perception only in ranges, such as “2 to 5 percent.” Therefore, the degree of “rounding responses” cannot be observed.

(Figure 11) Distribution of Inflation Perceptions in the Eurozone



3.3 Inflation Perceptions and Price Index Based on Frequently Purchased Goods

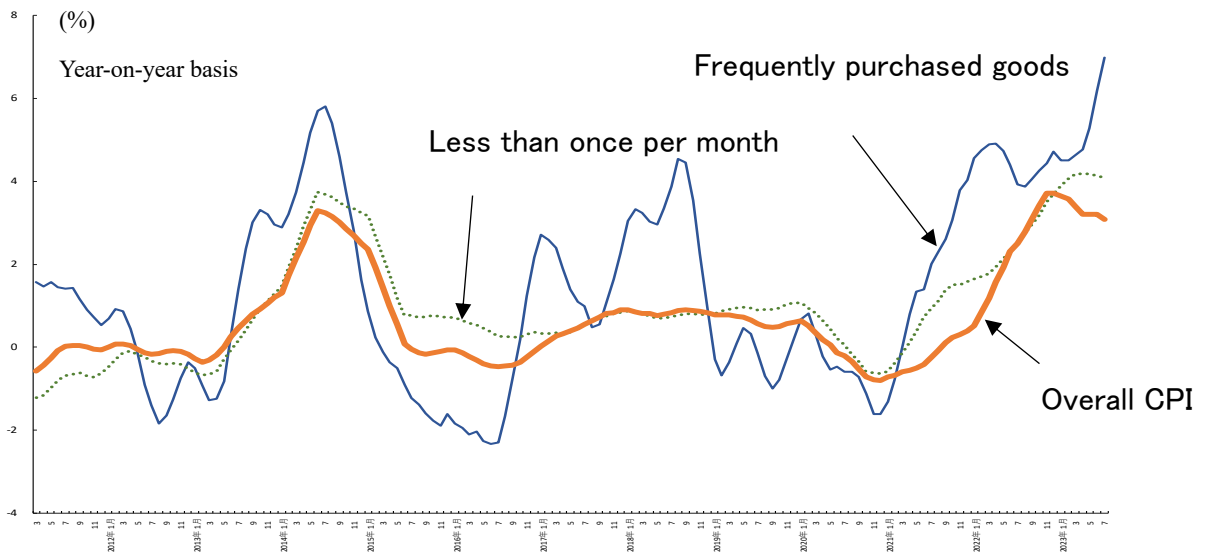
As described in the previous subsection, a “worse performer” relies heavily on the price development of frequently purchased goods rather than macroeconomic information when forming inflation perceptions. This tendency has been reported not only in Japan but also in the U.S., the Eurozone, Germany,⁸ and Denmark.⁹

The Japanese Consumer Price Index publishes a price index according to purchase frequency (Figure 12). The price development of frequently purchased goods has three features. First, it is more unstable than the overall CPI, or goods purchased less than once per month. Second, during the entire period shown in the figure; the average rate is 1.4 percent, which is higher than the overall CPI average of 0.6 percent. Third, during the current inflationary period, although the overall CPI has already peaked, the frequently purchased price index continues to rise.

⁸ Deuche Bundes Bank (2023)

⁹ Demark National Bank (2019)

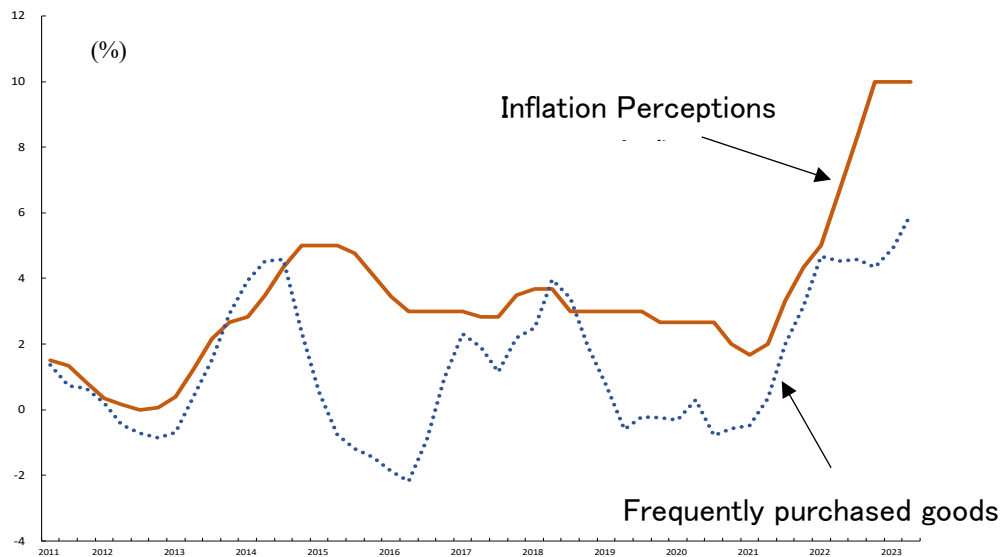
(Figure 12) Changes in CPI by Frequency of Purchase



(Source) Statistics Bureau of Japan

Figure 13 plots the price index of frequently purchased goods and inflation perceptions. Compared to the overall CPI, shown in Figure 2, the gap between price index and inflation perceptions has narrowed. However, before the current inflationary period, inflation perceptions are much more stable than the frequently purchased goods index.

(Figure 13) Inflation Perceptions and Prices of Frequently Purchased Goods



(Source) CPI from the “Consumer Price Index,” inflation perceptions from the Bank of Japan (2023b).

The “consumer price index” statistics refer the “family income and expenditure survey” for consumers’ frequency of purchases. According to these statistics, six items were purchased once or more per week, all of which were food. Goods purchased once or more per month include 80 items, such as food, gas, medical expenses, and daily necessities, and their share of total expenditure amounts to slightly more than 10 percent.¹⁰

The fact that the most frequently purchased goods consist of food and gas is consistent with the statistical analysis and anecdotal evidence. In fact, a paper published by the Bank of Japan showed the effect of food and gas prices on inflation perceptions using statistical models. Another study by the Central Bank of Germany mentioned food and gas as frequently purchased goods.¹¹ A study by the Ohio State University conducted a simulated consumer purchasing behavior test and concluded that food and gas prices are affecting inflation perceptions (they termed this “frequency bias,” and it exists in perception).¹² Furthermore, a study by the Central Bank of Denmark stresses the significant effect of food prices on inflation perceptions.¹³

Another study by the Bank of Italy showed that consumers cannot precisely recall information on rarely purchased goods such as durables, and this phenomenon distorts inflation perceptions.¹⁴

3.4. Inflation Perceptions and Food and Gas Prices

The last subsection reveals that consumers refer to the prices of frequently purchased goods, such as food and gas, in forming inflation perceptions. In this subsection, we calculate the weighted average index based on the food and gas prices in Japan. The weight of food is 26.2%, and that of gas is 1.8 percent, according to the CPI statistics (Figure 14).

Comparing the food and gas price index (FGPI) shown in Figure 14 with the overall CPI (Figure 2) and the prices of frequently purchased goods (Figure 13) yielded three features. First, the gap between inflation perceptions and FGPI is smaller than those among the other indices. Second, the FGPI closely follows the surge in inflation

¹⁰ Nihon-Keizai-Shinbun (2023)

¹¹ Deuche Bundes Bank (2023)

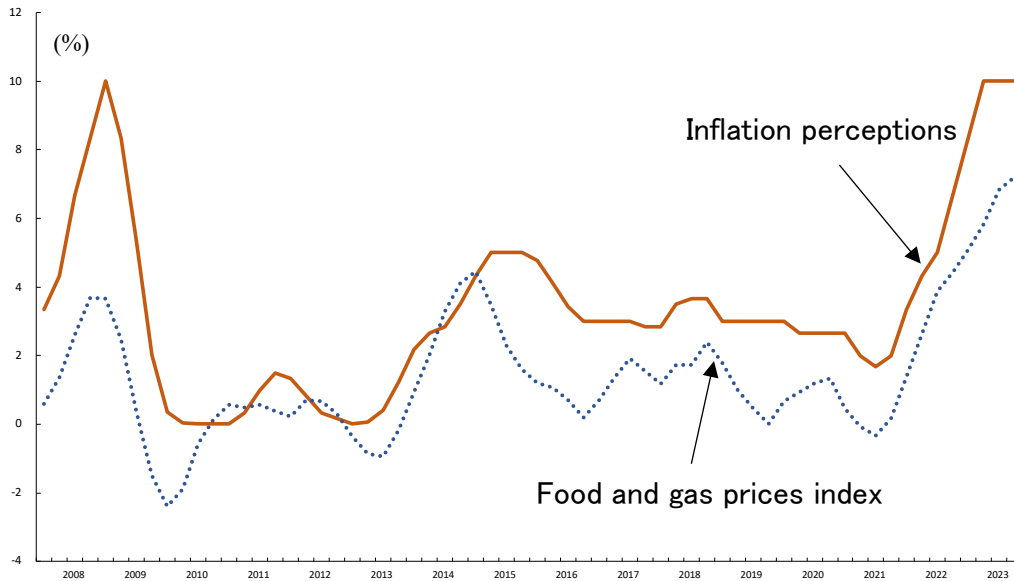
¹² Georgans et al. (2014)

¹³ Demarks National Bank (2019)

¹⁴ Bank of Italy (2008)

perceptions, especially during the current inflationary phase. Third, the correlation between inflation perceptions and the FGPI increases to 0.84, whereas that with the overall CPI is 0.76. These findings indicate that most households refer to the FGPI when forming inflation perceptions.

(Figure 14) Inflation Perception and the Food and Gas Price Index



(Source) CPI from “Consumer Price Index,” inflation perceptions from Bank of Japan (2023b).

The CPI is often criticized for its significant divergence from inflation perceptions. The CPI is a weighted average of the prices of individual items using the share of their expenditure as their weights. Although such an approach is reasonable as an official statistic, there is room to develop a new price index that can follow inflation perceptions more closely than the official CPI by changing the weights from expenditure share to frequency of purchases and focusing only on frequently purchased goods and services.

Some Japanese economists developed a new price index based on this notion.¹⁵ They calculated their own price index based on (1) limiting items to goods and services purchased more than once a week and (2) changing weights from expenditure to frequency of purchases. This new index amounted to 14.0 percent in June 2023, which is much closer to inflation perceptions than the overall CPI.

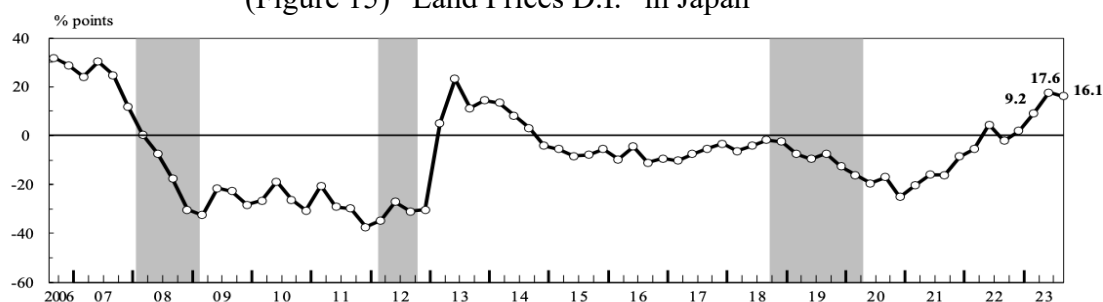
Furthermore, some argue that the gap between the inflation perceptions and overall

¹⁵ Nihon-Keizai-Shinbun (2023)

CPI is partly due to the fact that the CPI does not cover real estate prices.¹⁶ Many consumers have misunderstood that the CPI included real estate prices because they did not understand its definition and coverage. An Italian survey revealed that more than half of the respondents (51.4%) incorrectly reported inclusion of house prices in the CPI definition.¹⁷

Figure 15 shows households' outlook for real estate prices surveyed by the Bank of Japan's "Opinion Survey." "Land Prices D.I." is calculated as deducting the proportion of respondents who answered "land prices will go down" from the proportion who responded "land prices will go up." The D.I. increased steadily from the beginning of 2021 until the most recent survey, and this upward trend may have contributed to heightened inflation perceptions during the current inflationary phase. This finding implies that real estate price movements should also be considered when developing a new price index.

(Figure 15) "Land Prices D.I." in Japan



- Notes: 1. The land prices D.I. is calculated as the proportion of respondents who answered that land prices "will go up" minus the proportion of those who answered that they "will go down."
 2. The land prices D.I. registered a record high of 31.9 percentage points in September 2006, and a record low of minus 37.5 percentage points in December 2011.
 3. Shaded areas indicate recession periods.

(Source) Bank of Japan (2023b)

3.5. Inflation Perceptions and Loss Aversion of Consumers

The last subsection discusses the effects of the FGPI as a cause of the divergence between the CPI and inflation perceptions. However, this factor alone cannot explain the overall divergence between the two indicators. This is because, as Figure 2 indicates, although inflation perceptions constantly exceed the overall CPI, the FGPI is not guaranteed to move constantly above the overall CPI. Therefore, additional factors are

¹⁶ Bank of Canada (2020) and D'Ancuto et al. (2019)

¹⁷ Bank of Italy (2022)

required to explain this phenomenon. From this point of view, this subsection discusses consumers' loss aversion, and the next subsection considers the effect of the quality adjustment of CPI statistics as a factor that provides upward bias to inflation perceptions.

Loss aversion is a concept often used in behavioral economics and psychology. It is a psychological phenomenon in which people are 2.5 times more sensitive to suffering the same amount of loss than gaining pleasure. It also applies to daily purchasing behaviors, where increases in the prices of frequently purchased goods, which is a loss to the household budget, cause much more damage to consumers than the same amount of price decline, which is a gain to the household budget. A study by the Bank of England referred to this phenomenon as "salient events," and it may have increased inflation perceptions significantly.

As Figure 14 shows, the FGPI is more unstable than the overall CPI, and this, combined with loss aversion, may have increased inflation perceptions. Such a possibility has been pointed out in many related studies, including those by the Economic and Social Research Institute in Japan,¹⁸ the Central Banks of Canada, Denmark, and England, the Federal Reserve Board in the U.S., and the European Central Bank.

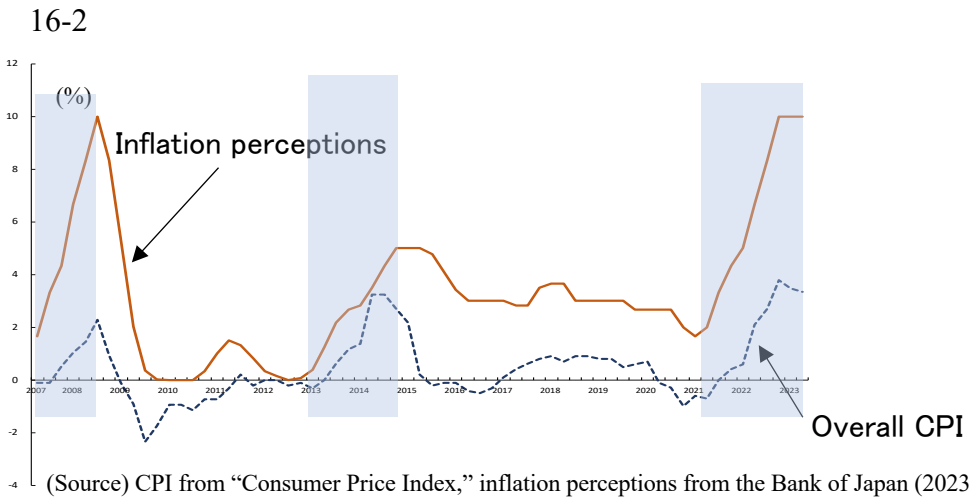
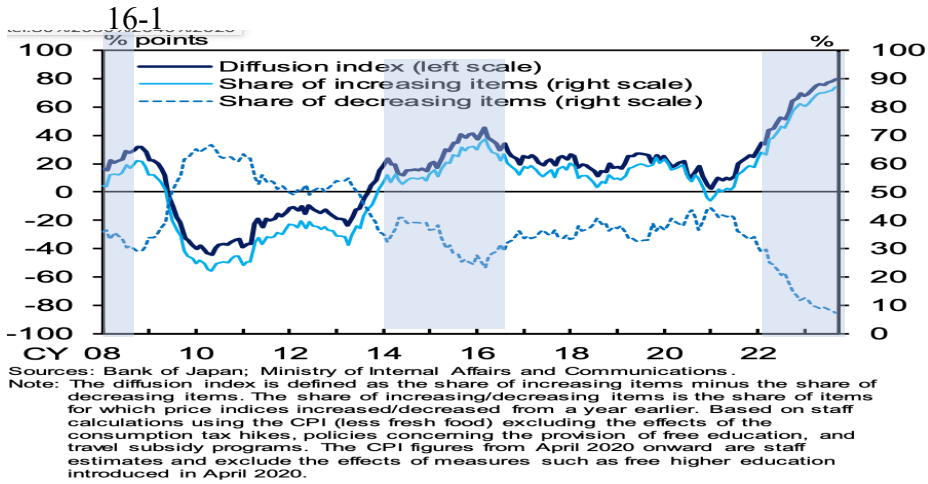
Figure 16-1 shows the share of price-increasing items in Japan. Although raw data were not available, and statistical analysis could thus not be conducted, the timing of the widening gap between inflation perceptions and the overall CPI in 16-2 and the timing of the growing proportion of price-increasing items in 16-1 nearly match. During the current inflationary phase, the gap between inflation perceptions and the CPI widened significantly, which was not seen in the low-inflation period. This may partly reflect consumers' loss aversion, stimulated by a surge in consumer goods prices and an increasing proportion of price-increasing items.

Figure 17 showed the relationship between news heard of price decreases/increases and inflation expectations in the U.S.¹⁹ Consumers' response to price development is asymmetrical and much more sensitive to "price increases" than "price decline," which is consistent with the loss aversion theory. Additionally, one-year-ahead inflation expectations, as a proxy for inflation perceptions, are significantly affected by news about price increases.

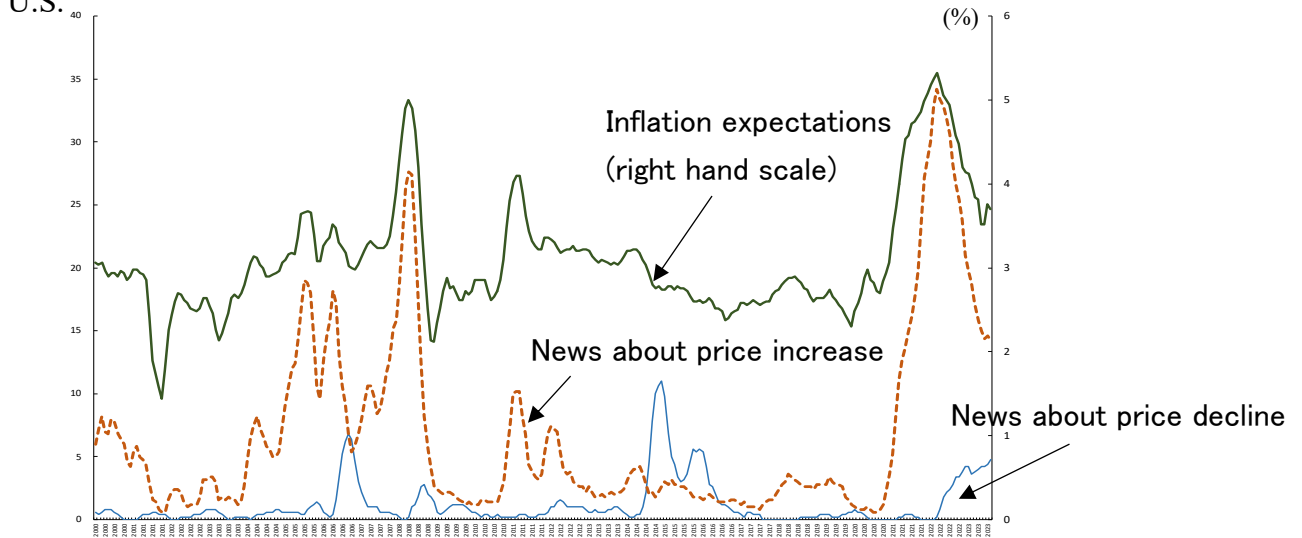
¹⁸ ESRI (2013)

¹⁹ Ehrmann et al. (2017). Please note that in the U.S., long-term inflation perceptions are not available. Data used in Figure 17 were derived from the University of Michigan Survey.

(Figure 16) Share of Price-Increasing Items and Inflation Perceptions in Japan



(Figure 17) News Items Heard About and the One-Year-Ahead Inflation Expectations in the U.S.



(Source) The University of Michigan Consumer Survey. Jan. 2000 to Dec. 2023.

3.6. Inflation Perceptions and the Quality Adjustment of the CPI

The CPI statistics adjust each item's price index according to changes in quality. For example, even if the retail prices of PCs remain unchanged, their price index will decrease as their performance improves. On the other hand, consumers focus only on changes in retail prices. Therefore, these differences in price perceptions cause an upward bias in inflation perceptions.

Shimizu,²⁰ the Federal Reserve Board,²¹ and the central banks of Denmark, Ireland, and Canada refer to the effect of quality adjustment. The Bank of Canada estimates that quality changes lower the CPI by 0.2 percent.

3.7. Consumers' Past and Present Experiences of Inflation

Consumers' past and present experiences of inflation may affect inflation perceptions and expectations. For example, the "Great Inflation" in the U.S. in the 1970s and the "Oil Price Shock" in Japan in the same decade have contributed to increased inflation expectations. The December Study showed that inflation expectations as surveyed by the University of Michigan rose significantly in the 1970s and remained high until the first half of the 1980s.

By contrast, economies have suffered from a long period of low inflation or mild deflation since the late 1990s in Japan and the late 2000s in other developed countries. Because price fluctuations remained modest during this period, consumers paid less attention to price movements. Instead, their attention shifted to other, more urgent economic issues such as the employment situation and wage increases. Such changes in attention occur due to psychological mechanisms that efficiently allocate limited recognition resources according to the priority of economic issues. The consumers' tendency to pay less attention to price development during low-inflation periods is called "rational inattention." This is rational behavior in the sense that when prices are stable, it is rational to allocate limited cognitive resources to other economic issues and intentionally pay less attention to price development.²²

For example, a study by the Bank of Canada pointed out that the 25 years of low-inflation period has caused Canadian consumers "rational inattention" to price

²⁰ Shimizu (2008)

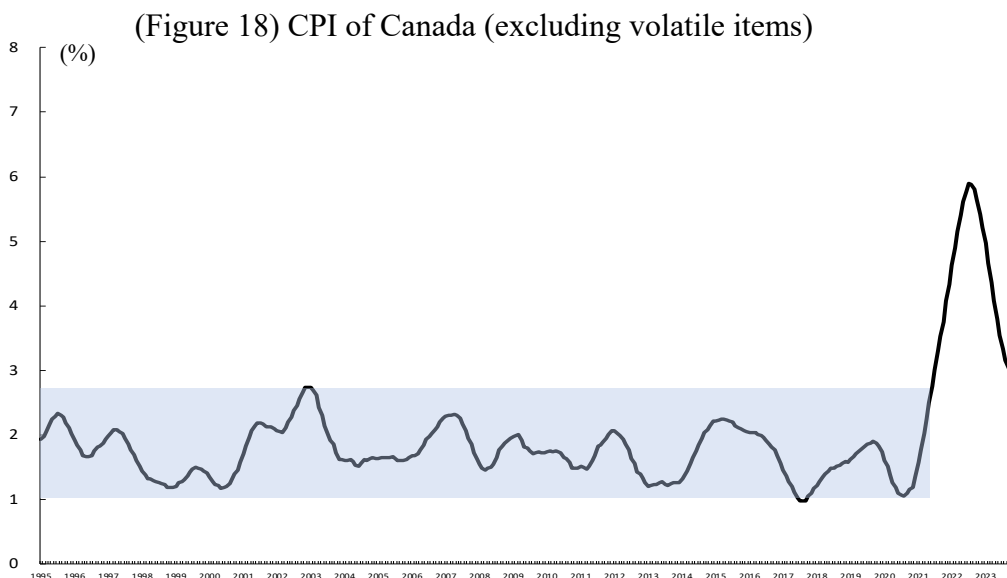
²¹ FRB (2018)

²² BOE (2019)

developments (Figure 18).²³ The Bank of England’s survey showed that the percentage of respondents who chose “inflation is significant problem” was more than 50 percent in the high-inflation period of the 1970s but had declined to less than 10 percent just before the pandemic began in 2019. Another study by the Central Bank of Germany argued that because the young generation only experienced a low-inflation period, rational inattention became dominant.²⁴ However, this rational inattention suddenly disappeared at the beginning of the current inflationary period, and people began to pay attention to inflation (Figure 19).

Some economists argue that significant inflation and deflation have long-term effects on inflation perceptions and expectations. For example, the inflation perceptions of those who experienced high inflation remain relatively high for a long period compared to those who did not experience such a situation.

However, statistically speaking, the results of testing the relationship between the cohort and inflation perceptions are mixed depending on the surveyed countries and periods; thus, it is too early to determine whether inflation perceptions are affected by cohorts.

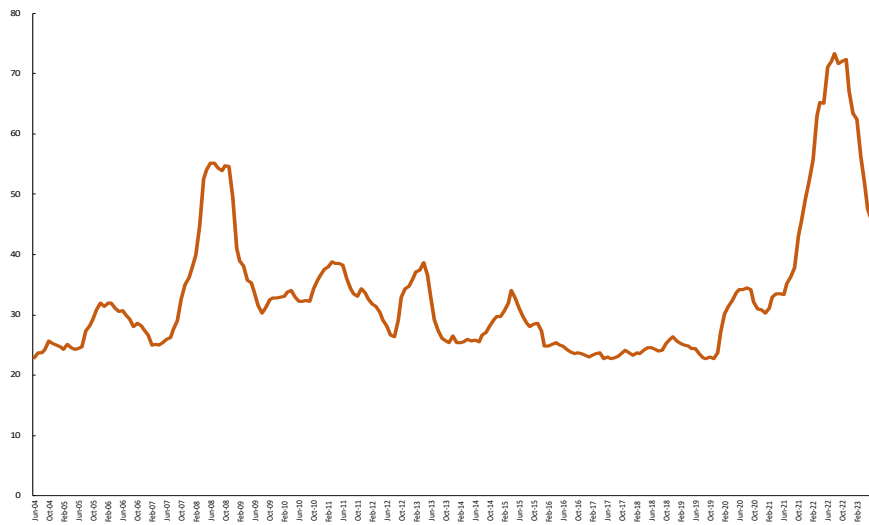


(Source) Statistics Canada, Consumer Price Index

²³ Bank of Canada (2020)

²⁴ Deuche Bundes Bank (2023)

(Figure 19) Search Results for “Inflation”



(Source) Google Trend. The word “inflation” in Japanese was used. Nine months moving average. Peak level is set at 100.

4. The Relationship between Inflation Expectations and Inflation Perceptions

As pointed out in Section 2, studies on inflation perceptions have recently become popular because inflation perceptions have been increasingly considered the basis of inflation expectations. This approach has the advantage of explaining households’ inflation expectations better than the traditional approach.²⁵ The evidence of a close relationship between inflation perceptions and expectations is outlined below.

First, consumers’ socioeconomic attributes affect both inflation expectations and perceptions similarly. For example, several socioeconomic attributes affect inflation perceptions. First, women’s perceptions of inflation were generally higher than those of men. Second, the higher the educational background, the lower is the perception of inflation. Third, people with higher incomes have lower inflation perceptions. Fourth, inflation perception decreases as financial literacy improves.

A survey by the Federal Reserve Bank of Cleveland in the U.S. yielded several results.²⁶ First, men’s inflation perception was 4.6 percent from August 1998 to November 2001, whereas that of women was 6.9 percent. The inflation expectations of men and women were 4.0 percent and 6.4 percent, respectively. Second, households were

²⁵ As noted in the December Study, households refer to not only inflation perceptions but also other macroeconomic information available to them. This is supported by the time difference correlation analysis showing inflation expectations, which contains information about the future outlook in addition to inflation perceptions.

²⁶ FRB of Cleveland (2001)

divided into five income levels, and the lowest-income group responded with inflation perceptions of 9.2 percent, whereas for those in the highest-income group, the percentage was 4.7. In terms of inflation expectations, the lowest-income group responded with 8.4 percent, whereas the highest-income group responded with 4.4 percent. Third, the inflation perception of university graduates was 4.8 percent, and that of those whose education level was high school graduate or below was 7.5 percent. Similarly, the inflation expectation of those who had graduated from university was 4.4 percent, whereas that of people who had graduated from high school or less was 6.6 percent.

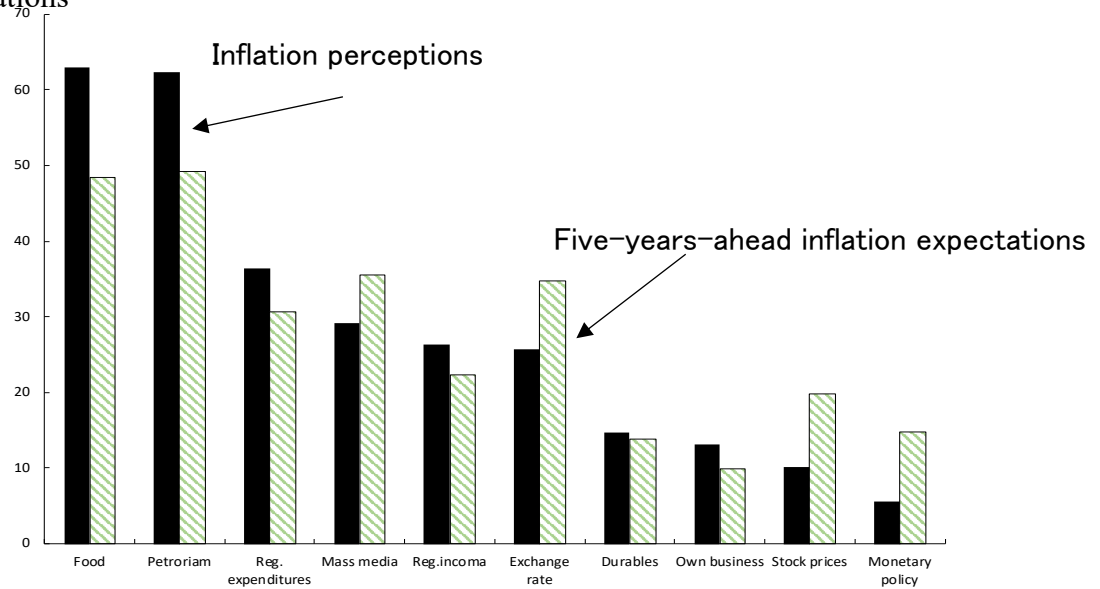
The mechanism behind the relationship between inflation expectations/perceptions and socioeconomic attrition, especially gender differences, has been widely studied, but no convincing explanations have yet been offered. Influential hypotheses include that, first, because women are still more often engaged in daily shopping than men, women are more aware of changes in the price movements of frequently purchased goods, as described in subsections 3.3. and 3.4. Second, because the portion of women still not engaged in jobs is greater than that of men, they are not interested in inflation development and thus become “worse performers” more often than men.²⁷

Moreover, household survey results have shown that consumers rely heavily on inflation perceptions when responding to questions on inflation expectations. Figure 20 is a result of the Bank of Japan’s “Opinion Survey” asking information sources of inflation perceptions and expectations. Compared to the responses for inflation perceptions, answers for five-years-ahead inflation expectations are tilted toward macroeconomic variables affecting future inflation development, such as exchange rates, stock/land prices, and monetary policy. This tendency is consistent with the results of a December Study, which applied time-difference correlation analysis and found that inflation expectations contain unique information not included in inflation perceptions.

However, more than half of responses were assigned to “backward-looking factors,” implying that households rely heavily on inflation perceptions (backward-looking factors) when forming inflation expectations (Figure 21).

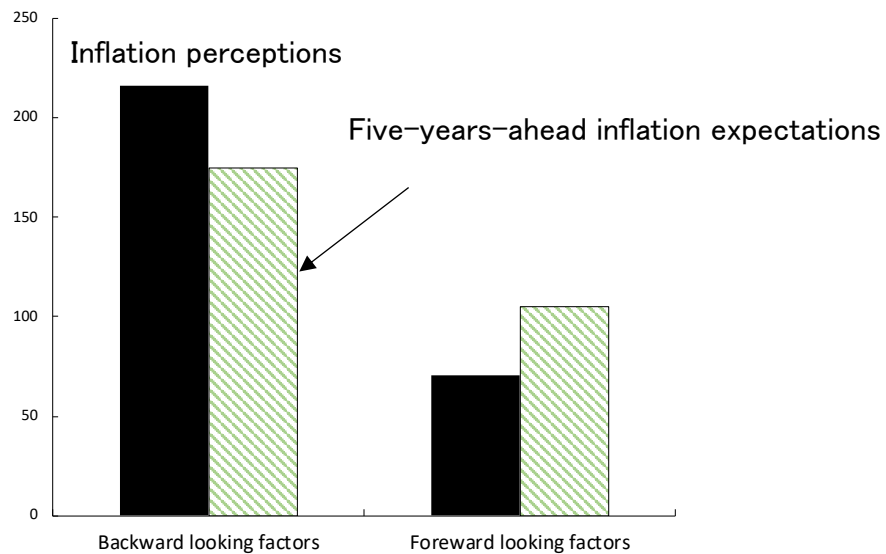
²⁷ NBER (2020) and Hayo and Neumeier (2022)

(Figure 20) Information Sources of Inflation Perceptions and Five-Years-Ahead Expectations



(Source) BOJ (2013).

(Figure 21) Backward/Forward-Looking Factors as Sources of Inflation Perceptions and Five-Years-Ahead Expectations



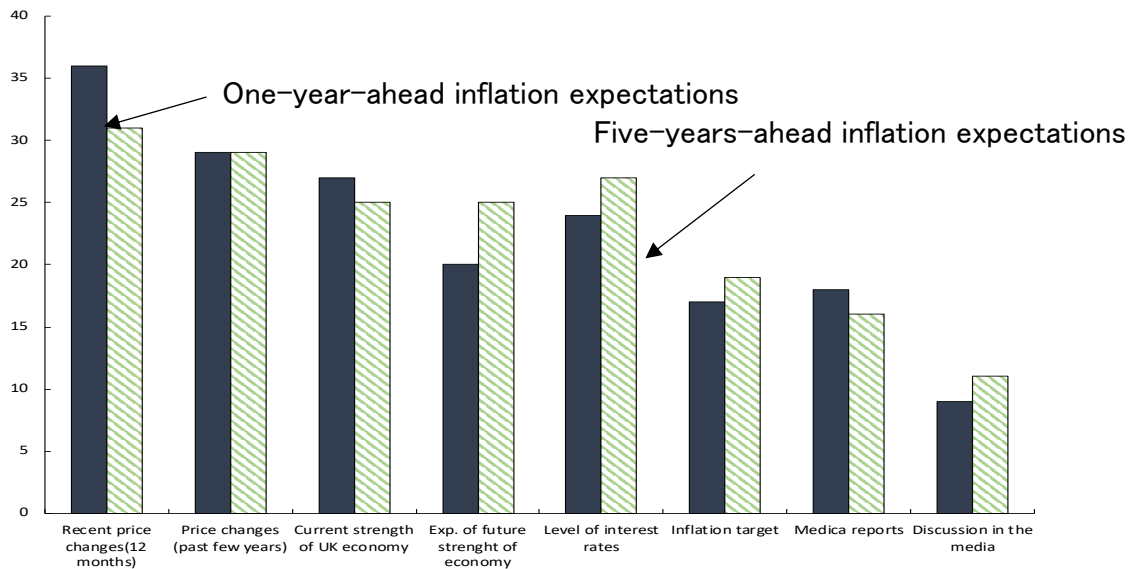
(Source) BOJ (2013) modified by the author.

Similarly, a survey conducted by the Bank of England shows that households rely heavily on backward-looking information when forming inflation expectations (Figure 22). The survey compares the important factors in determining inflation expectations for one and five years ahead. In the figure, long-term inflation expectations were determined by relatively more forward-looking factors, such as “expectations of future economic strength,” “level of interest rates,” and “discussion in the mass media,” than short-term

inflation expectations. When sorting these factors into “backward-looking factors” or “forward-looking factors,” such as the survey of the Bank of Japan, five-years-ahead expectations contain more forward-looking factors than one-year-ahead expectations (Figure 23).

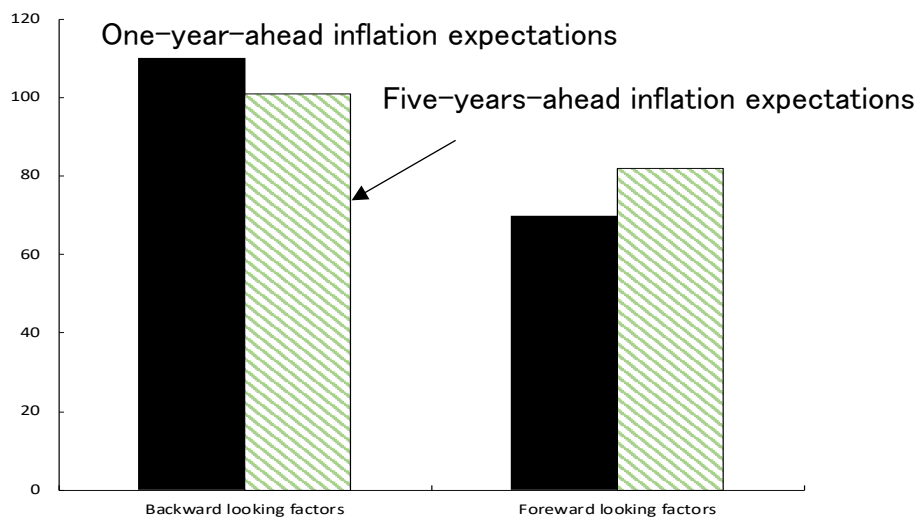
However, the share of “backward-looking factors” exceeded that of “forward-looking factors,” even in the case of five-years-ahead expectations, implying the importance of inflation perceptions in forming inflation expectations.

(Figure 22) Important Factors Reported as Determining Inflation Expectations in U.K.



(Source) BOE (2016)

(Figure 23) Backward/Forward-Looking Factors as Determining Inflation Expectations in U.K.

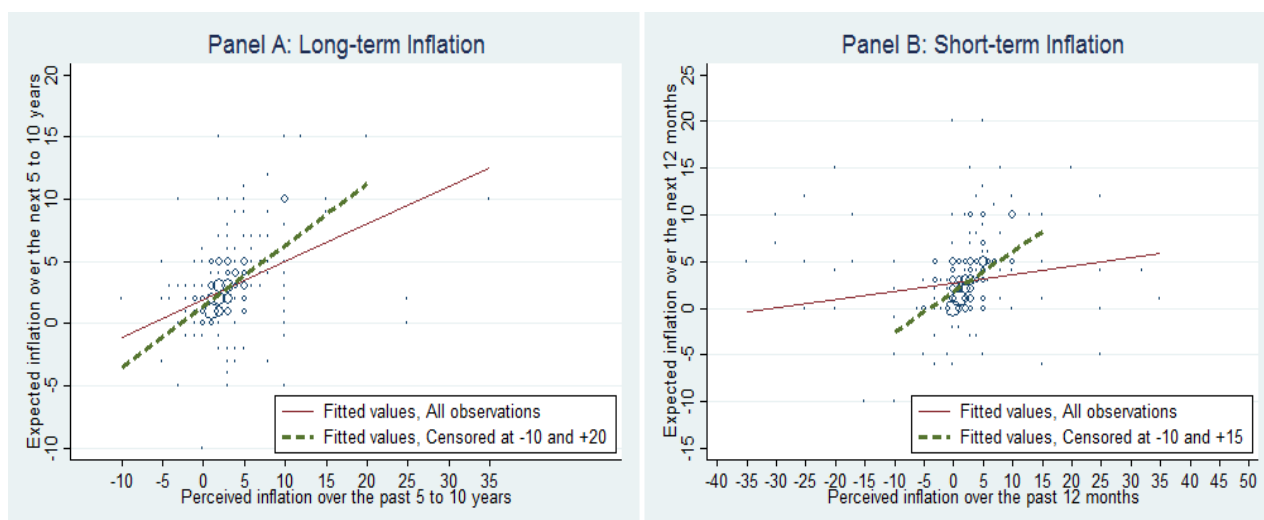


(Source) BOE (2016), modified by the author.

Third, there is a strong correlation between inflation expectations and perceptions when using individual household data. Figure 24 shows an example of an analysis conducted by the Federal Reserve Board. Regrettably, as yet, no individual data have been disclosed in Japan.²⁸

These figures plot the correlation between inflation perceptions on the horizontal axis and inflation expectations on the vertical axis. The figure on the left side indicates the long-term relationship (5–10 years), and the right side shows the short-term (1 year) relationship. The green line is the result of a linear regression, limiting the X variables from -10 to +20 percent.

(Figure 24) The relationship between the inflation perception and inflation expectations



(Source) FRB (2016) Figure 3.

Another study by the Central Bank of Germany calculated the pass-through from inflation perceptions to expectations.²⁹ A 1 percent increase in inflation perceptions increased inflation expectations by 0.74 percent in the long term and 0.53 percent in the short term. In addition, the pass-through was higher when the actual inflation rate was lower. A similar statistical analysis was conducted by the Bank of England, which reported a 0.4 percentage point pass-through in five-years-ahead expectations.³⁰

²⁸ FRB (2016)

²⁹ Deuche Bundes Bank (2023)

³⁰ BOE (2016)

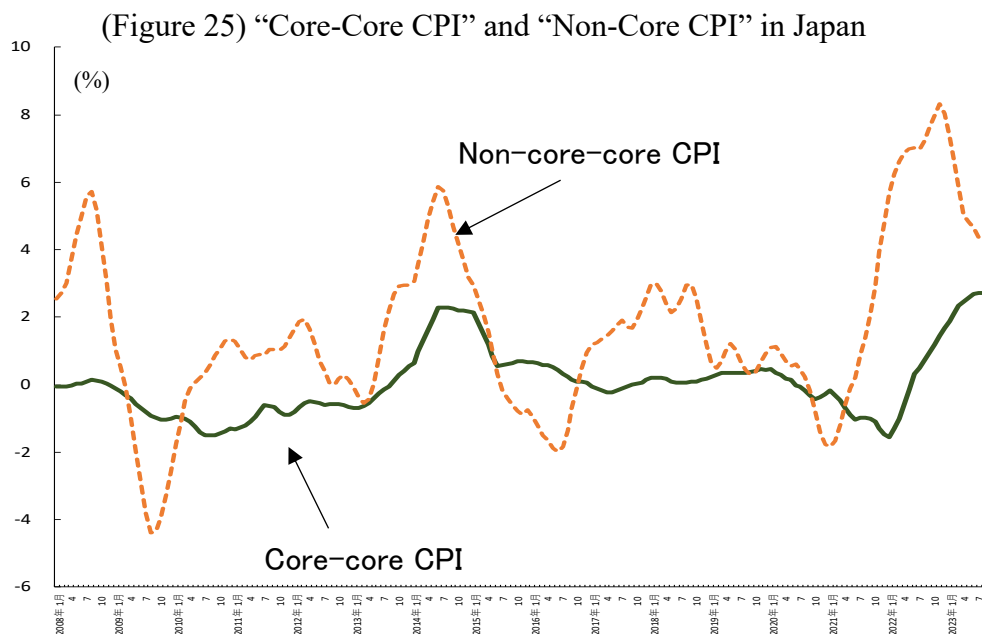
5. Implication for Monetary Policy Implementations

As inflation perceptions significantly affect the formation of inflation expectations, they have important implications for monetary policy implementation.

5.1. Demerits of Focusing Only on Core CPI as a Policy Indicator

When discussing monetary policy implementation, often-used price indicators are the “core-core CPI,” which exclude food and gas prices to reduce short-term fluctuation of the overall CPI. Although it is of the utmost importance to understand correctly the fundamental movement of prices, we should also bear in mind that the “non-core CPI” consisting of food and gas prices significantly affect inflation perceptions.

Therefore, both core CPI and non-core CPI should be included when monitoring price development (Figure 25). Additionally, the development of a new type of price index is required. The weight of this index should reflect the purchasing frequency and consumers’ loss aversion (asymmetric weights).³¹



(Source) Statistics Bureau of Japan, “Consumer Price Index”

³¹ D’Ancuto et al. (2019)

5.2. Macroeconomic Effect of Inflation Perceptions/Expectations

As discussed in section 4, inflation expectations differ significantly depending on socioeconomic attributes such as gender, school career, and income level. For example, women have higher inflation expectations than men. Because nominal interest rates are equal for both sexes, real interest rates are lower for women than for men. This causes distortions in household behavior, such as expenditure, savings, and investment. In addition, inflation expectations significantly affect wage negotiations. This, in turn, affects the efficiency of macroeconomic resource allocation.³²

The central bank of Germany's latest study stresses the importance of policymakers paying more attention to analyzing and monitoring inflation perceptions.³³ In Japan too, further effort should be devoted to analyzing households' inflation expectations and perceptions and their application to monetary policy decisions.

5.3. The Central Bank's Actions to Guide Household Inflation Expectations

Central banks should not only monitor households' inflation expectations and perceptions but also promote the proper formation of inflation expectations by following practices to improve the efficiency of monetary policy implementation.

First, central bank communication with the general public account for the fact that inflation expectations differ significantly depending on socioeconomic attributes, such as gender and income level.

Second, to reduce the upward bias of inflation expectations compared with the CPI, central banks need to promote financial education for households so that they can actively gather and understand macroeconomic information, including the CPI. The background factor for such efforts is that the higher the financial literacy, the lower are the inflation expectations. In other words, as the previously mentioned study by the ECB stressed, improving financial literacy would increase the number of "better performers" and decrease that of "worse performers." Other studies have highlighted similar views.³⁴

³² NBER (2020)

³³ Deuche Bundes Bank (2023)

³⁴ ESRI (2022), ECB (2017), and Hayo and Neumeir (2022)

6. Conclusion

This study analyzed the formation process of inflation perceptions and discussed the relationship between inflation expectations and perceptions as well as the implications for monetary policy.

Research on inflation perceptions is scarce because household inflation perceptions constantly exceed the CPI at a significant level. This attitude gradually changed as it was considered to form the basis for inflation expectations. At the same time, the following reasons explain the divergence between CPI and inflation perceptions.

First, households lack an understanding of CPI statistics. They rely mostly on the price development of frequently purchased goods when responding to inflation perceptions. In fact, a price index composed of food and gas prices fits inflation perceptions more closely than does the overall CPI.

Second, consumers tend to be loss averse. They are 2.5 times more sensitive to the same amount of loss compared to gain. This sensitivity increases inflation perceptions, particularly when large portions of goods and services are experiencing rising prices.

Third, the CPI adjusts the quality improvements for each item by lowering the price index. Households, however, only refer to retail prices, which do not reflect quality changes; thus, the divergence between the CPI and inflation perceptions widens.

The following evidence emerged regarding the relationship between inflation expectations and perceptions. First, differences in socioeconomic attributes, such as gender, income level, and educational background, affect inflation expectations and perceptions in the same manner. Second, according to household surveys, households rely heavily on inflation perceptions when responding to inflation expectations. Third, a cross-sectional analysis using individual samples showed a strong correlation between inflation expectations and perceptions.

The significant role played by inflation perceptions in forming expectations has implications for monetary policy implementation. First, food, and gas prices, which are excluded from the “core-core” CPI, are important components of price movements when assessing households’ inflation perceptions. Second, socioeconomic attributes affect inflation expectations and thus distort real interest rates and efficient resource allocation. Third, households’ financial literacy should be improved through financial education to encourage the formation of inflation perceptions in response to macroeconomic situations.

As research on inflation perceptions is scarce, further studies are required to accumulate survey data on the formation mechanism of inflation perceptions and their relationship with inflation expectations. The urgent task is to disclose detailed survey results, such as individual sample data, data sorted by socioeconomic attributes, and distributions of inflation perceptions and expectations.

(References)

- Bank of Canada (2020) “Perceived Inflation and Reality: Understanding the Difference”
Remarks by Deputy Governor L. Schembri
- Bank of Italy (2008) “What’s Behind “Inflation Perceptions? A Survey-Based Analysis of Italian Consumers,” P. D. Giovane, S. Fabiani and R. Sabbatine, Working papers No.655, January 2008
- Bank of Japan (2022) “Households’ Perceived Inflation and CPI Inflation: The Case of Japan,” Y. Takahashi, Y. Tamanyu, No.22 E-1, March 2022
- (2023a) “Outlook of Economic Activity and Prices,” October 2023
- (2013), (2023b) “Opinion Survey”
- BOE (2016) “How Are Households’ Inflation Expectations Formed?” Quarterly Bulletin 2016 Q2, J. Rowe
- (2019) “Understanding Inflation: Expectation and Reality,” Sylvania Tenreyro, July 10, 2019
- Bruine de Bruin W et al. (2013) “Measuring Inflation Expectations,” Annual Review of Economics, 2013
- CCFSI (2022) “Financial Literacy Survey,” Central Council for Financial Services and Information
- Central Bank of Ireland (2022) “What Drives Consumers’ Inflation Perceptions in the Euro Area?” Economic Letter Vol. 2022, No.6
- D’Ancuto et al. (2019) “Exposure to Daily Price Changes and Inflation Expectations,” E. D’Ancuto, U. Malmendier, J. Ospia, M. Weber, NBER Working Paper 26273, September 2019
- Demarks National Bank (2019) “Revisiting the Inflation Perception Conundrum,” K. Ablidgen, A. Kuchier
- Deuche Bundes Bank (2023) “The Pass-through from Inflation Perceptions into Inflation Expectation,” Discussion Paper No17/2023, S. Huber, D. Minira, T. Schmidt
- ECB (2017) “EU Consumers’ Quantitative Inflation Perceptions and Expectation: An Evaluation,” R. Arioli, C. Bates, H. Dieder, I. Duca, R. Friz, C. Gayer, G.

- Kenny, A. Meyler, I. Pavlova, ECB Occasional Paper Series No.187, April 2017
- Ehrmann et al. (2017) “Consumers’ Attitudes and Their Inflation Expectations,” M. Ehrmann, D. Pfajfar, E. Stantoro, International Journal of Central Banking February 2017
- ESRI (2013) “Disagreement and Biases in Inflation Expectations of Japanese Households,” Y. Ueno and R. Namba, Discussion Paper Series No.300, Economic and Social Research Institute, Cabinet Office of Japan,
- (2022) ”Micro-shock and Macroeconomic Forecast,” Y.Iizuka, J. Kikuchi, Y. Nakazono, “Keizai-Bunseki,” No. 204 (Japanese only)
- FRB (2001) “The Demographics of Inflation Opinion Surveys,” Federal Reserve Bank of Cleveland, October 2001
- (2016) ” Inflation Perception and Inflation Expectations,” FEDS Notes 2016/12, A. Detmeister, D. Lebow, E. Peneva
- (2018) “Perceptions and Expectations of Inflation by U.S. Households,” Finance and Economics Discussion Series 2018-073, A. Axerlrod, D. Lebow, E. Peneva
- FRB of Cleveland (2001) “The Demographic of Inflation Opinion Surveys,” M. Brayan, G. Venkatu, October 15, 2001
- Georgans et al. (2014) “Frequency Bias in Consumers’ Perception of Inflation: An Experimental Study,” European Economic Review 67, S. Georgans, P. Healy, N. Li
- Hayo and Neumeier (2022) “Households’ Inflation Perceptions and Expectations: Survey Evidence from New Zealand,” Bearnd Hayo and Florian Neumeier, International Economics and Economic Policy (2022)
- NBER (2020) “Gender Roles and the Gender Expectation Gap,” NBER 26837, March2020
- Nihon-Keizai-Shinbun (2023) “Price Development Analysis Needs to Consider Degree of Frequent Purchasing Behavior: Inflation Perspective and the Monetary Policy,” S. Abe and N. Inekura, August 25, 2023 (Available in Japanese only)
- Shimizu (2008) “Quantitative Analysis on Recent Inflation Perceptions,” M. Shimizu,” “Toukei” October 2008 (Japanese only)