

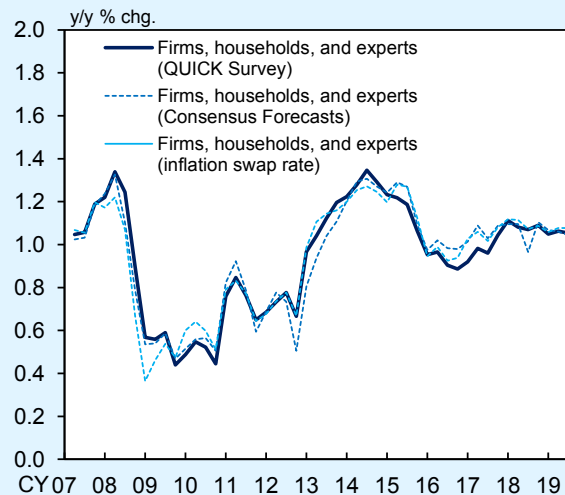
(Box 7) Developments in Inflation Expectations

One of the factors that determine general price developments is people's inflation expectations. This box examines (1) recent developments in indicators of inflation expectations and (2) households' perception of prices as well as firms' price-setting stance.

Inflation expectations can be gauged, first of all, by directly observing survey data -- that is, indicators based on the results of surveys of households, firms, and experts (such as economists and market participants) -- and market indicators (Charts 46 and 47). However, since these indicators have their own characteristics, they do not show exactly the same developments. They also show fluctuations due to noise. In fact, looking at recent developments, while some indicate relatively weak developments, others show an increase. By extracting and synthesizing the common factors from the survey data of households', firms', and experts' inflation expectations as well as market indicators through principal component analysis, it can be confirmed that such expectations had remained in a weakening phase since summer 2015 but picked up somewhat toward 2018 and subsequently have been more or less flat (Chart B7-1).³⁸ In addition, inflation expectations also can be gauged based on various economic indicators by using economic models, and the estimates indicate similar results to principal

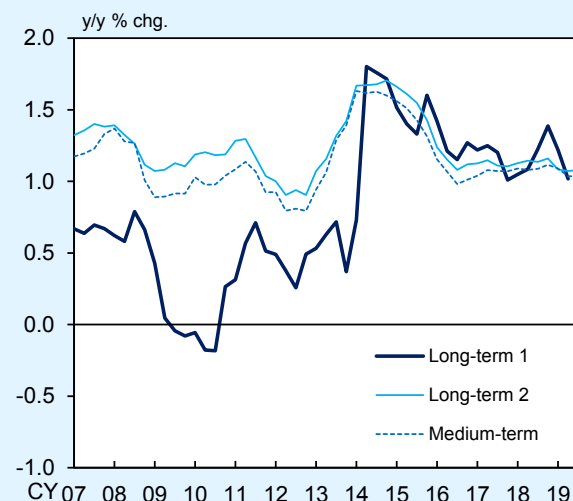
³⁸ For details of methods to extract and synthesize inflation expectations using principal component analysis, see "Developments in Inflation Expectations over the Three Years since the Introduction of Quantitative and Qualitative Monetary Easing (QQE)," *Bank of Japan Review Series*, no.16-E-13.

Chart B7-1: Synthesized Inflation Expectations Indicators



Sources: Bank of Japan; QUICK, "QUICK Monthly Market Survey (Bonds)"; Consensus Economics Inc., "Consensus Forecasts"; Bloomberg.
 Notes: 1. Synthesized inflation expectations indicators are obtained by synthesizing the expectations of firms, households, and experts using principal component analysis.
 2. Firms' inflation expectations are taken from the *Tankan* (using the output prices DI). Figures for households are taken from the "Opinion Survey" (using the average of inflation expectations over the next 5 years excluding responses of those expecting annual inflation of $\pm 5\%$ or more). For experts' inflation expectations, three different types of data are used: the "QUICK Survey" (average over the next 10 years), the "Consensus Forecasts" (average for 6-10 years ahead), and the inflation swap rate (5-year, 5-year forward).

Chart B7-2: Inflation Expectations Obtained through Estimations

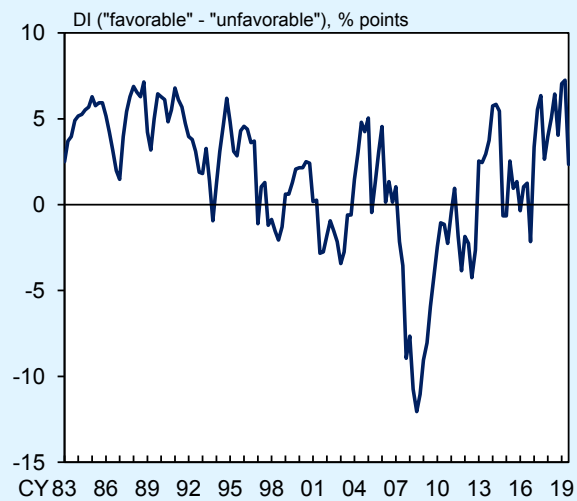


Sources: *Bank of Japan Working Paper Series*, No.18-E-8 and No.19-E-6; Bank of Japan; Cabinet Office; Ministry of Finance; Ministry of Internal Affairs and Communications; QUICK, "QUICK Monthly Market Survey (Bonds)," "QUICK *Tankan*"; JCER, "ESP Forecast"; Consensus Economics Inc., "Consensus Forecasts"; Wolters Kluwer, "Blue Chip Economic Indicators"; Bloomberg.
 Note: For the estimation methods, see *Bank of Japan Working Paper Series*, No.18-E-8 for "Long-term 1," see *Bank of Japan Working Paper Series*, No.19-E-6 for "Long-term 2" and "Medium-term."

component analysis; namely, that inflation expectations have been generally more or less flat (Chart B7-2).³⁹

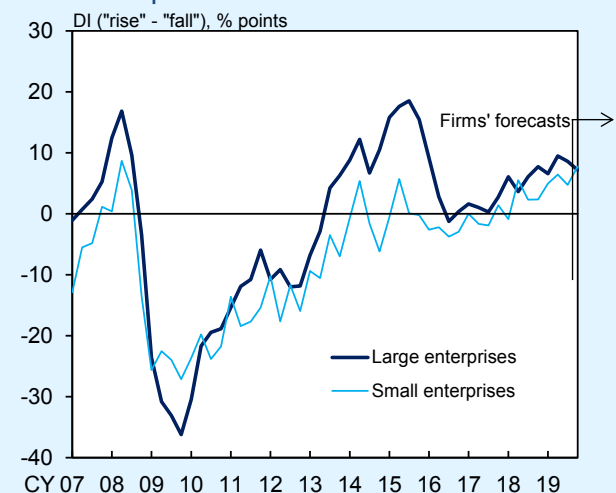
In addition to estimates using the aforementioned various indicators and economic models, it is important to monitor changes in households' perception of prices as well as firms' price-setting stance in order to grasp developments in people's inflation expectations. For example, "comments on the rise in prices" from the *Opinion Survey on the General Public's Views and Behavior* can be regarded as a measure for households' tolerance of price rises (Chart B7-3).⁴⁰ Households' tolerance rose following the introduction of QQE in 2013 and declined temporarily thereafter. Since 2017, however, it has remained at a level that exceeds the average since the mid-2000s, albeit with fluctuations. In addition, when aggregating the output prices DI for "retailing," "services for individuals," and "accommodations, eating and drinking services" in the *Tankan* to look at the price-setting stance of firms that are closely related to household consumption, we see that it has continued on an improving trend within positive territory, albeit at a moderate pace (Chart B7-4). Thus, there are signs that households' tolerance of price rises will increase and firms' stance will shift toward further raising prices,

Chart B7-3: Households' Tolerance of Price Rises



Sources: Bank of Japan; Cabinet Office.
 Notes: 1. Figures for 2004/Q4 onward are taken from the "Opinion Survey." Figures prior to 2004/Q4 are extrapolated backward using the overall livelihood DI in the "Consumer Confidence Survey."
 2. The average of figures for 2004/Q4 onward is normalized to zero.

Chart B7-4: Output Prices in Consumption-Related Sectors



Source: Bank of Japan.
 Note: Based on the *Tankan*. Calculated as the weighted average of the DI for changes in output prices in "retailing," "services for individuals," and "accommodations, eating & drinking services." The number of reporting enterprises is used as weights.

³⁹ The estimation methods for inflation expectations using economic models include (1) a method based on a model that incorporates learning -- in other words, the impact of people's short-term inflation forecast errors on long-term inflation expectations -- and (2) a method using a state-space model, based on theoretical relationships, for survey data and market indicators. For details, see "The Anchoring of Inflation Expectations in Japan: A Learning-Approach Perspective," *Bank of Japan Working Paper Series*, no.18-E-8; and "Inflation Expectations Curve in Japan," *Bank of Japan Working Paper Series*, no.19-E-6.

⁴⁰ For details, see Box 2 in the July 2018 Outlook Report.

although both have remained cautious. Regarding the outlook, it is expected that households' tolerance of price rises will increase steadily and firms' stance gradually will shift toward further raising prices as the employment and income situation is likely to continue improving with the economy maintaining an expanding trend and the output gap remaining positive.

However, there is a possibility that a rise in inflation expectations will be delayed through the adaptive formation mechanism if (1) it takes longer than projected for households' tolerance of price rises to increase and for firms' stance to shift toward further raising prices and (2) actual inflation consequently remains relatively sluggish. Due attention should be paid to this possibility because it could become greater if risks to economic activity materialize and thereby put downward pressure on the output gap in a situation where downside risks concerning overseas economies seem to be increasing.