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# The evolution of inflation expectations in Japan☆

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ABSTRACT

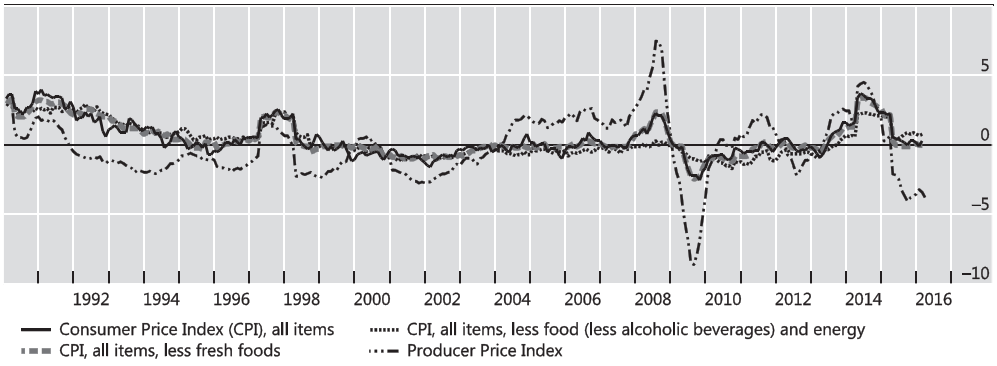
We model inflation forecasts as monotonically diverging from an estimated long-run anchor point towards actual inflation as the forecast horizon shortens. Fitting the model with forecasts made by individual professional forecasters for Japan, we find that the estimated anchors across forecasters have tended to rise in recent years, along with the dispersion in estimates across forecasters. Further, the degree to which these anchors pin down inflation expectations at longer horizons has increased, but remains considerably lower than found in a similar study of Canadian and US forecasters. Finally, the wide dispersion in estimated decay paths across forecasters points to a diverse set of views across forecasters about the inflation process in Japan.

## 1. Introduction

In this paper, we assess the evolution of inflation expectations for Japan. Japan experienced repeated bouts of mild deflation in the Consumer Price Index (CPI) from the latter half of the 1990s until positive inflation returned soon after the Bank of Japan's introduction of quantitative and qualitative monetary easing (QQE) in 2013, followed by near-zero inflation beginning in 2015 (see Graph 1).[1] Measures of core inflation display similar patterns while the Producer Price Index (PPI) looks broadly similar, but with larger swings in each direction.

Price indices in Japan

Year-on-year changes, in per cent — Graph 1




Sources: Datastream; national data.

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[1] Bank of Japan (2015) attributed various factors to the recent near-zero inflation including oil price developments, softer consumption after the consumption tax hike and weakness in emerging market economies.

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Many different factors are likely to play a role in explaining these dynamics. Nishizaki et al. (2014) identified a number of structural features that underpin Japan's chronic low inflation. These include the zero lower bound on the nominal interest rate, public attitudes toward the price level, central bank communication, weak growth expectations backed by declining potential growth and the low natural rate of interest, private banks' risk averse behaviour, deregulation and the growing presence of emerging economies in the global economy.

Aside from structural features, inflation expectations may also play a key role in the dynamics of inflation outcomes. In New Keynesian models, for example, firms adjust prices in response to expected inflation. In reduced form, the New Keynesian Phillips Curve implies that inflation responds approximately one-for-one to shocks to inflation expectations. Inflation expectations are, in turn, likely to be affected by many factors, including the inflationary environment.

One key facet of the inflation environment for Japan has been a declining level of trend inflation over a prolonged period. Saito et al. (2012), Nishizaki et al. (2014) and Kaihatsu and Nakajima (2015) report declining trend inflation based on a New Keynesian Phillips Curve model of the Japanese economy during the 1990s. The estimation results of Saito et al. (2012) show the declining trend extending to the mid-2010s. This is likely to have affected inflation expectations, particularly in the longer run, by influencing the level of inflation that the economy would converge to in the absence of shocks. From a theoretical point of view, inflation expectations, especially at longer horizons, are likely to be influenced by two main factors: the central bank's target inflation rate, whether implicit or explicit, and the public's confidence in the central bank's achievement of the target rate. At short horizons, however, inflation expectations may be more heavily influenced by actual inflation outcomes, and reflect nominal shocks to the economy, as well as the output gap.

In the case of Japan, there have been a number of changes in the explicit target of monetary policy in recent years that may have influenced the anchoring of inflation expectations. In January 2013, the Bank of Japan implemented a monetary policy regime with an explicit numerical inflation rate target based on the CPI for the first time. But this change was only one step in the evolution of the central bank's public pronouncements on the desired role of price stability, reaching back at least a decade. Even mentioning a numerical reference point for the inflation rate in the context of setting monetary policy in central bank statements is a relatively recent change. By contrast, there was a time when the central bank suggested that providing an explicit reference to the inflation rate of any particular price index could be misleading and work against securing price stability. Appendix A summarizes the various official statements that are helpful for understanding the evolution of views at the Bank of Japan regarding price stability and inflation rate references.[2]

References to the CPI inflation rate in Bank of Japan statements started increasing around the middle of the 2000s (see Appendix A). In March 2006, for example, policy board members' views of a connection between "understanding of medium- to long-term price stability" and a numerical reference to the CPI inflation rate were first aired. At that time, the reference was to a rate of CPI inflation between zero and two percent, with a focus on the midpoint of around one percent. In February 2012, the Bank of Japan became more explicit about its understanding of desirable inflation rate, and adjusted its language of its "understanding of price stability" as an "inflation goal" of one percent rate of CPI inflation, but without any commitment to the time horizon at which the goal would be achieved. At the same time, the central bank announced that, in its judgement, the price stability goal in the medium- to long-term was in the positive range of two percent or lower.

The Bank of Japan moved to a formal inflation targeting regime, with a two percent target specified in terms of CPI inflation, in January 2013. Within a few months, in April 2013, it had introduced quantitative and qualitative easing (QQE) measures with the objective of achieving that target, within a horizon of two years. The QQE measures were intended to de-anchor persistent deflationary expectation and re-anchor inflation expectation at the target level.[3]

The two-year time-horizon for achieving the two percent inflation target was later modified in response to inflation developments. While the initial adoption of the time horizon implied that the inflation objective would be achieved around the end of the 2015 fiscal year, successive publications of the Bank of Japan's "Outlook for Economic Activity and Prices" in April and October 2015 and January and April 2016 have pointed to delays in the achievement of the objective to "around the first half of fiscal 2016", "around the second half of fiscal 2016", "around the first half of fiscal 2017" and "during fiscal 2017", respectively.[4]

In this paper, we apply the approach introduced in Mehrotra and Yetman (2014), and extended to forecaster-level data in Yetman (2017), to examine how inflation expectations' anchoring has varied over time in Japan. The model we estimate is identical to that in these previous papers. What is new is its application to an economy with unique inflation dynamics relative to most other countries in terms of persistent very low levels of inflation over a prolonged period, and also one where, arguably, monetary easing has been implemented on an unprecedented scale (especially since 2013). In this model, inflation forecasts for each forecaster are a weighted sum of two components: a long-run forecaster-specific anchor that is estimated,[5] and the latest available actual inflation rate at the time that the forecast was made, with the weights summing up to one. The weight on the anchor is modelled with a flexible decay function, so that inflation forecasts monotonically diverge from their estimated anchor towards actual inflation as the forecast horizon shortens. We apply this model to forecasts made by professional forecasters, collected by Consensus Economics.[6]

The motivation for considering a model of this nature is easy to see from looking at the behaviour of panels of forecasts through time. The left-hand panels of Graph 2 display the forecasts from the three most frequent forecasters for the 2006–2015 period.[7] The horizontal axes are the forecast horizons, which run from $h = 24$ (forecasts made at the start of January, 24 months before the completion of the calendar year being forecast, the longest horizon at which Consensus Economics makes individual forecaster-level forecast data available) to $h = 1$ (made in December of the calendar year being forecast). The figures confirm our prior regarding the behaviour of expectations. The forecasts across the different years for a given forecaster are much more similar to each other at longer horizons than shorter ones. They then

[2] Appendix I builds on and extends Appendix I in Nishizaki et al. (2014), including information about the introduction of QQE and the adoption of an inflation target with a time horizon of two years.

[3] In the words of Kuroda (2013a), "[…] Japan faces a different type of challenge. In the United States and Europe, people's inflation expectations have been anchored around the central banks' targeted inflation rates. In Japan, amid some 15 years of deflation, deflationary expectations have become entrenched among people – in other words, people's inflation expectations have been anchored at a substantially low level of around 0 percent. We need to de-anchor such expectations, increase them to the price stability target of 2 percent, and anchor the expectations again at this level."

[4] In the Outlook for Economic Activity and Prices published on October 31, 2014, the Bank of Japan expected to achieve the objective "in or around fiscal 2015". Some of media interpreted this statement as indicating a postponement, but the Bank of Japan suggested that this did not represent a change in the time horizon.

[5] One definition of anchor given by the Oxford English Dictionary is "A person or thing that provides stability or confidence in an otherwise uncertain situation". In our context, the anchor is the expected level of inflation in the absence of any shocks to the economy. We estimate the anchor for each individual forecasters and discuss the evolution of its features. It should be noted that the anchor is not necessarily the same as the inflation target for the central bank.

[6] http://www.consensuseconomics.com/.

[7] We have 237, 235 and 238 forecasts for forecasters 10, 12 and 16 respectively for these 10 years (out of a possible total of 240).