Survey design and professional forecasters: The case of uncertainty in the US SPF

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Are we currently more or less uncertain about future inflation or growth than we were some years ago? To answer this question, we need to know how economic uncertainty has changed over time. Data from surveys of professional forecasters seem well suited for this purpose, but changes in the survey design can make it difficult to measure uncertainty consistently.

Economists nowadays agree that uncertainty has a major impact on economic developments. Measuring economic uncertainty has therefore become an important task. Surveys of professional forecasters contain valuable information about uncertainty. Forecasters are asked about the probabilities of, say, future inflation lying between 0 % and 2 %, 2 % and 4 % or outside these intervals. Researchers use these probabilities to quantify uncertainty about future inflation. Yet the width of these intervals can change over time, and the effects of these changes have mostly been ignored when deriving uncertainty measures. Is it possible to quantify the size of these effects? Moreover, can we undo these effects by adjusting the uncertainty measures? And might there be an optimal width for the intervals?

Interval changes in the US Survey of Professional Forecasters …

The US Survey of Professional Forecasters (US SPF) has provided probabilities for the outcomes of future growth and inflation for many decades. Currently, the Federal Reserve Bank of Philadelphia, which runs this survey, asks participants to assign these probabilities to events like inflation next year being lower than 0 %, falling into the interval from 0 % to 0.5 %, from 0.5 % to 1 % and so on, or being larger than 4 %. This results in a histogram forecast. Yet the intervals for inflation and growth have changed over time.

The Philadelphia Fed changed the histogram intervals mainly because of the Great Moderation and the COVID-19 episode. In 1981, the interval lengths amounted to 2 percentage points. In 1992, the Philadelphia Fed reduced the interval lengths to 1 percentage point. This reflected the drop in the volatility of inflation and growth due to the Great Moderation after the mid-1980s. For growth, the Federal Reserve increased the interval lengths at the onset of the COVID-19 episode in 2020 and decreased them again in 2024.

… cause breaks in measured uncertainty

Such changes in the interval lengths lead to structural breaks in measured uncertainty. Researchers often assume that forecasters always issue histogram forecasts that accurately reflect their uncertainty. Nevertheless, many forecasters assign positive probabilities to only a small number of intervals and simply set the probabilities of the other intervals to zero. If the interval length is halved, forecasters should assign positive probabilities to twice as many intervals, but they do not. For instance, a forecaster who used three intervals before the halving might use four intervals after the halving instead of using six.

Consequently, halving the length of intervals reduces measured uncertainty by about one-third. This

estimate is based on the halving of inflation intervals in 2014. Other measures show that true inflation uncertainty remained largely constant around 2014. Based on an estimated simple relation between interval lengths and measured uncertainty, we adjust the US SPF inflation and growth uncertainty series for structural breaks.

A modest proposal for an optimal interval width

The effect of interval widths on measured uncertainty allows us to determine an interval width that is optimal according to a simple criterion: the unbiasedness of uncertainty forecasts. The average true uncertainty can be estimated by the average squared error of the mean forecasts for a given horizon. The average forecast uncertainty can be estimated by the average variance of the histogram forecasts for this horizon. Under unbiasedness of uncertainty forecasts, the average true uncertainty and the average forecast uncertainty should coincide. The optimal interval width achieves exactly that: it makes the average variance forecast equal to the average true uncertainty.

The optimal interval widths depend on the forecast horizon. Longer horizons require wider intervals because the true uncertainty for longer horizons is larger. Rounded to multiples of 0.5, the optimal interval width of inflation forecasts equals 2 percentage points for the longest horizon and 1 percentage point for the shortest forecast horizon in the US SPF.

The figure below presents the forecast uncertainties for inflation. The upper panel shows the measured uncertainty, the lower panel the uncertainty that would have been observed if the optimal interval widths had been used. For the measured forecast uncertainty, one can clearly see the structural breaks caused by halving the interval widths in the first quarters of 1992 and 2014. The uncertainty based on optimal interval widths, which are set to be constant over time, does not have such breaks and has a more pronounced seasonal pattern, especially for the next-year forecasts.

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Be careful with uncertainty measures from survey histograms

This analysis highlights the need for caution when interpreting uncertainty measures derived from histograms in surveys of professional forecasters. Adjustments for structural breaks are crucial for consistent tracking and additional modifications are necessary to achieve unbiasedness.

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