Online Appendix. An implied yield curve

This appendix assesses the long-term interest rates during and after the YCC period, using the regression model in the main analysis. It limited the sample period up to August 2016 (right before the introduction of the YCC). Based on the estimated coefficients of specification (4) in Table 3, we compute fitted values of the nominal 10-year rate from September 2016 to August 2024. For this subsequent period, we use the independent variables' actual values. Figure A1 illustrates the implied rate (fitted value) along with the nominal 10-year rate.

Around the end of the sample period, the implied rate suddenly decreases because of the negative interest rate dummy, the coefficient of which is estimated as −0.5. This estimate implies that introducing a negative interest rate policy reduces the 10-year yield by approximately 50 basis points. As Ueno (2017) notes, market participants firmly recognized the effective lower bound of the nominal interest rate in Japan as zero before the negative interest rate policy. This suddenly changed the market perception of the effective lower bound, leading to a critical decrease in the long-term yield. For this reason, our analysis computes the implied rate by setting the negative interest rate dummy to one even after the policy rate hike in March 2024, as we consider it a candidate policy tool in the future.

Notably, the implied rate and the actual 10-year yield moved in almost the same manner from September 2016 to mid-2019. After a deep decline in the implied rate, mainly due to the lowering of the US 10-year yield from mid-2019 to the end of 2021, the implied rate gradually increased, and the actual rate increased as it followed the implied rate. The YCC framework evolved as a range for the 10-year rate target, which was recognized as zero percent plus or minus 10 bps by market participants in the early stages (Osada and Nakazawa, 2024). In July 2018, the Bank of Japan announced that the range had widened to double, plus or minus 20 bps. In March 2021 and December 2022, the range widened to plus or minus 25 and 50 bps, respectively. Finally, the Bank defined the upper bound of the 10-year rate as one percent in October 2023, and the YCC framework was terminated in March 2024.

The close alignment of these two figures from 2016 to 2019 and the parallel increase since 2022 would suggest that the monetary policy stance was in line with—and more accommodative than—the average stance during the estimation period (June 2001 to August

2016) if the relationship among the variables, market perceptions, and a monetary policy reaction function remained constant after the sample period. However, it may be difficult to justify whether these conditions hold, partly because the policy reaction function could be multidimensional and evolve during the period of interest. Nevertheless, the model's substantial out-of-sample forecasting ability for the actual 10-year yield could be a good sign of a reasonable and parsimonious modeling strategy for our analysis.

We extend the analysis of the 10-year JGB yield to other maturities in the JGB yield curve. We run the regression with the dependent variable set as the X-year nominal yield with X set as 2, 5, 7, 15, 20, and 30, using the same independent variables, except for the US yield. We compute the trend and cyclical components using the X-year US yield, corresponding to the maturity of the dependent variable. For the regression with 20-year and 30-year yields in the dependent variable, we use the trend and cyclical components of the 10-year US yield because Kim and Wright (2005) include no historical data on 20-year and 30-year US yields; and use the TYE based on all the remaining maturities.

Figure A2 presents the implied rates and actual yields for the maturities computed in the same manner as in Figure 6. All panels indicate that the out-of-sample implied rate tracks the actual yields to some extent.

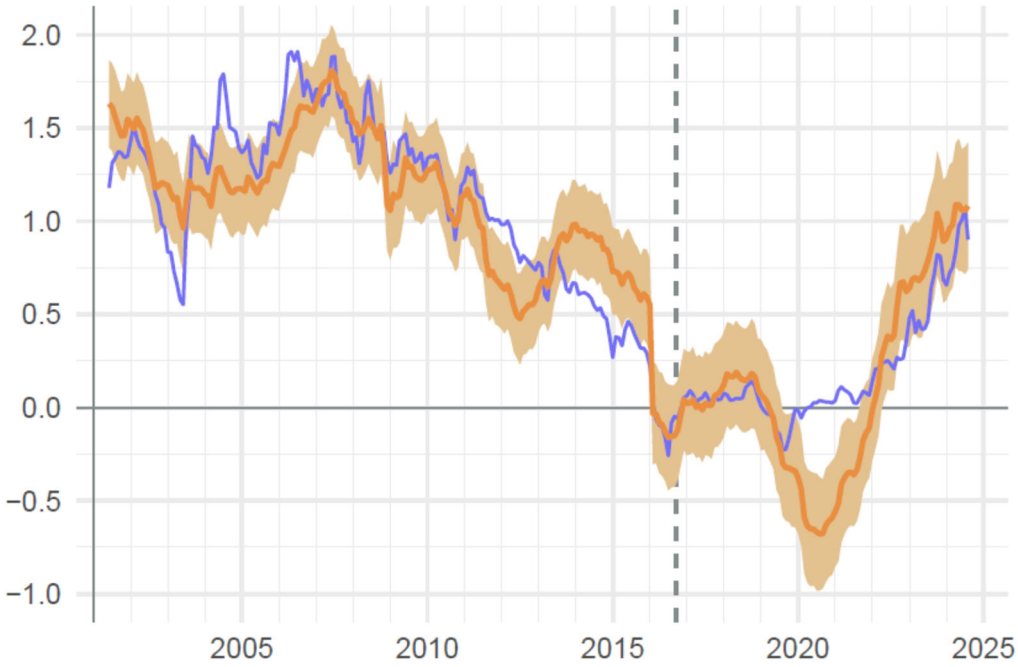
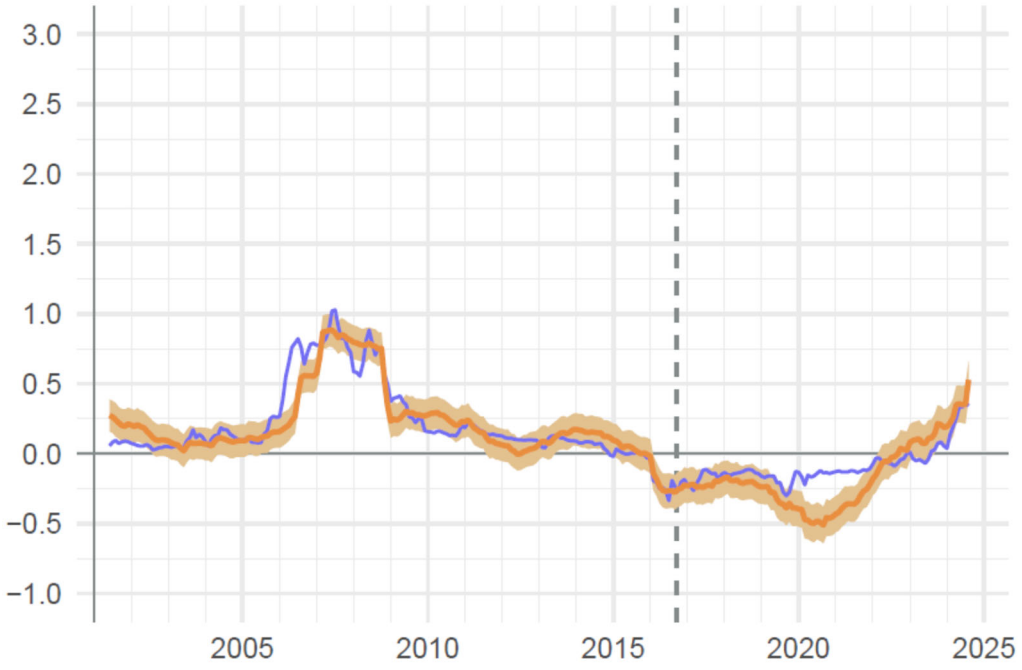


Figure A1: The implied rate of the fitted value from specification (4) in Table 3 with one-standard-error bands and the actual nominal 10-year rate. The regression coefficients are estimated using the data up to August 2016. For the subsequent period, the implied rate is computed using the independent variables' actual values.

(a) Two-year yield



(b) Five-year yield

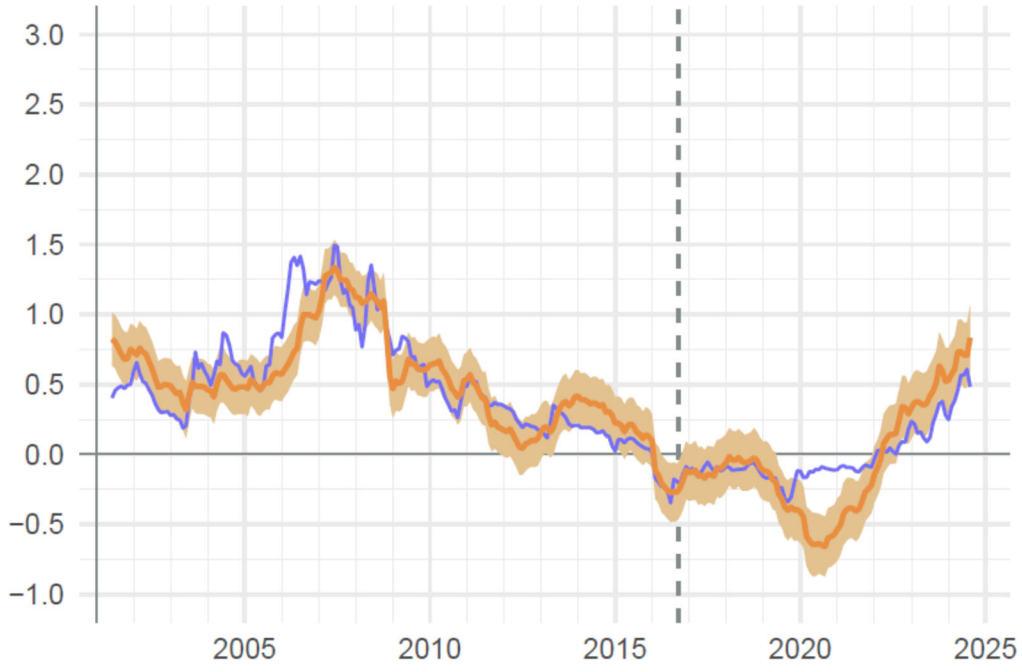
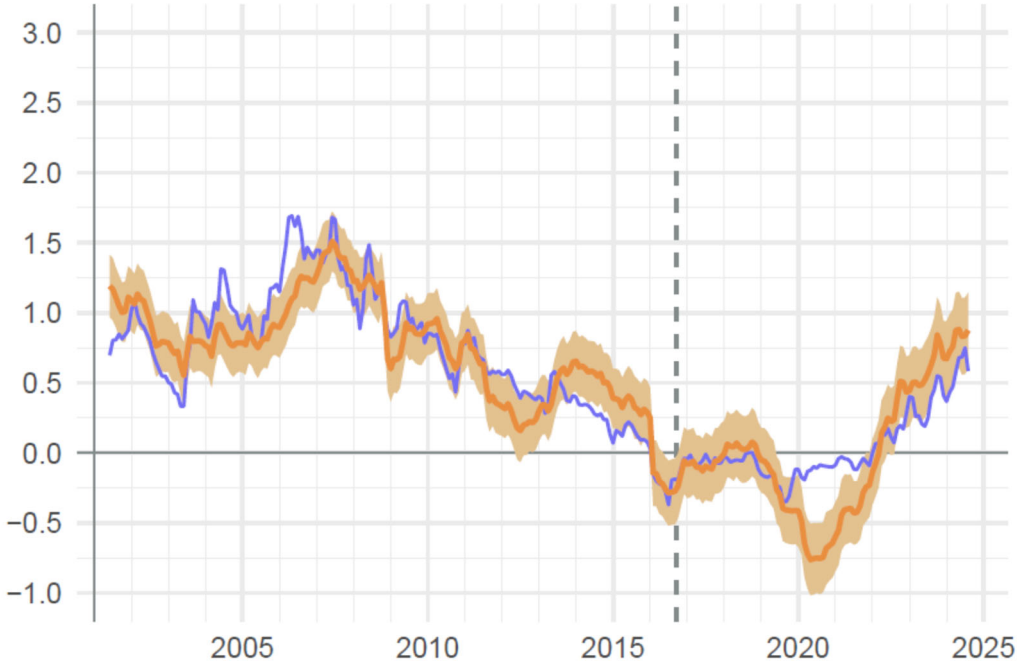


Figure A2: The implied rate of the fitted value from the regression with one-standard error bands and the actual nominal yields. The regression coefficients are estimated using the data up to August 2016. For the subsequent period, the implied rates are computed using the independent variables' actual values.

(c) Seven-year yield



(d) 15-year yield

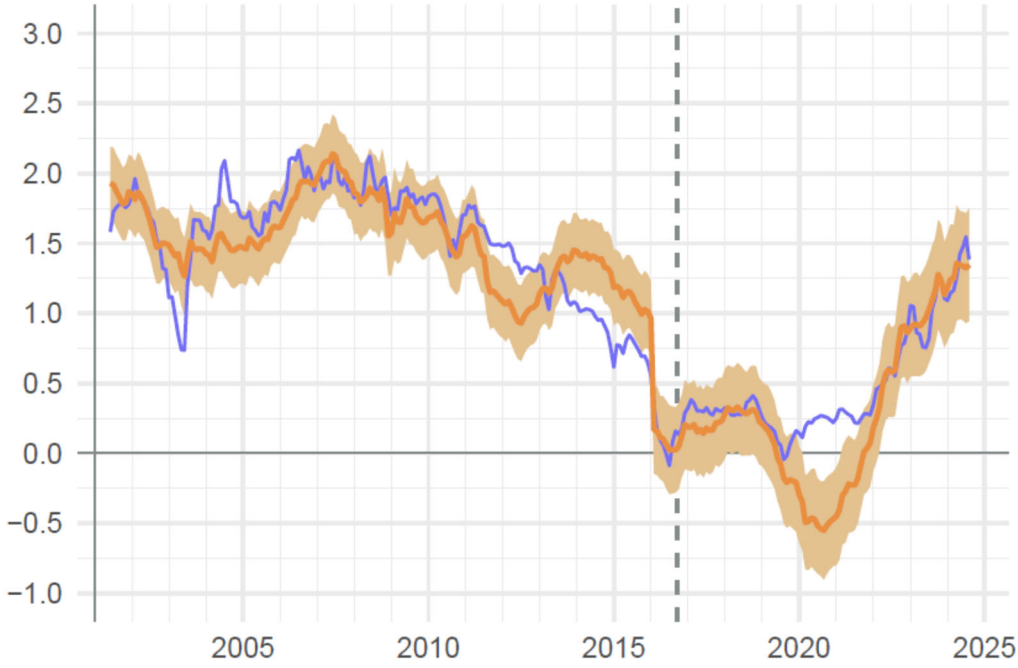
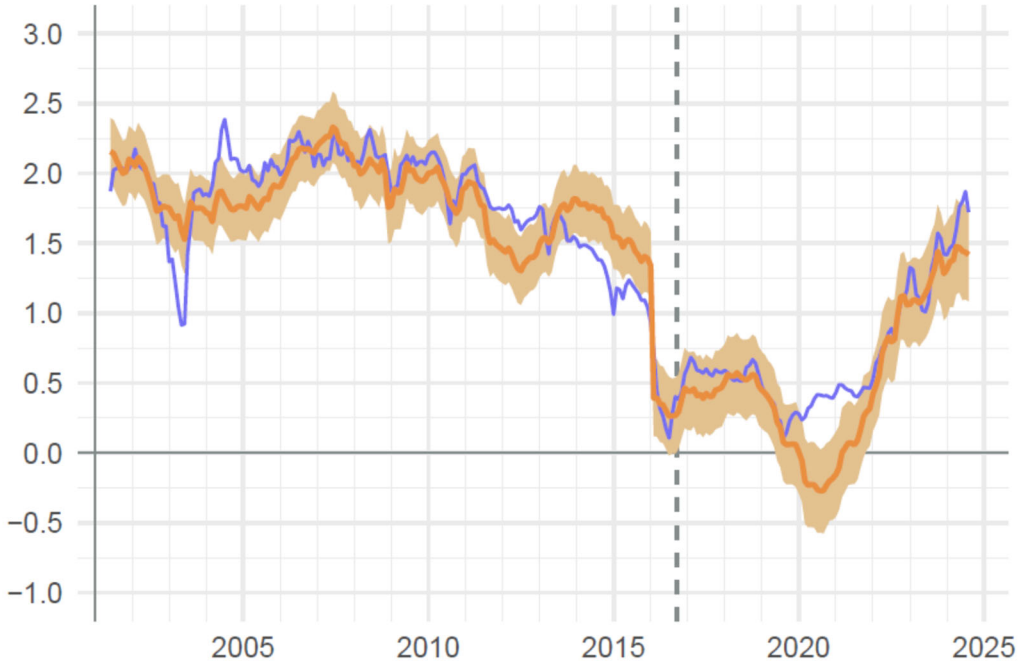


Figure A2 (cont.)

(e) 20-year yield



(f) 30-year yield

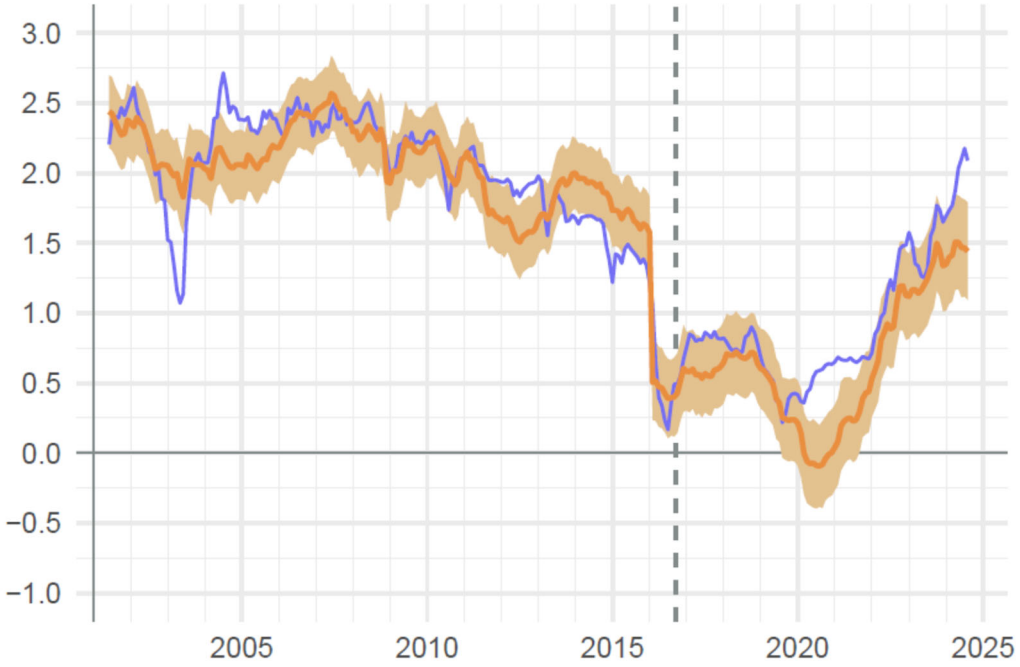


Figure A2 (cont.)