Web Appendix for: "What does Monetary Policy do to Long-Term Interest Rates at the Zero Lower Bound?"

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This not-for-publication web appendix gives additional results for the paper: "What does Monetary Policy do to Long-Term Interest Rates at the Zero Lower Bound?"

As noted in footnote 12, an alternative approach is to avoid estimating a VAR altogether, and instead simply assume that the expectation of each interest rate on day t is well approximated by it's value on day $t-1$. This means that the one-step-ahead forecast errors, ε_t, can simply be approximated by ΔY_t. The difference between the variance-covariance matrix of ΔY_t on announcement and non-announcement days can again be factored as in equation (3), giving estimates of the instantaneous impulse responses of the monetary policy shock. However, in avoiding estimating a VAR, this approach gives up on trying to estimate the impulse responses at longer horizons. Indeed this approach of treating the daily first differences as approximate reduced form errors was employed by Rigobon and Sack (2005).

The results are shown in **web appendix Table A1**. The size of the monetary policy shock is normalized to be one that lowers ten-year Treasury yields by 25 basis points. It generates causes a small and not quite statistically significant drop in two-year yields, and significantly lowers corporate bond yields. The instantaneous impulse responses are qualitatively similar to those from estimating the VAR by OLS, although the point estimate of the impact on corporate yields is a bit larger, and close to the point estimate when estimating the VAR using the Minnesota prior. This isn't surprising, since the Minnesota prior shrinks towards the series being random walks.

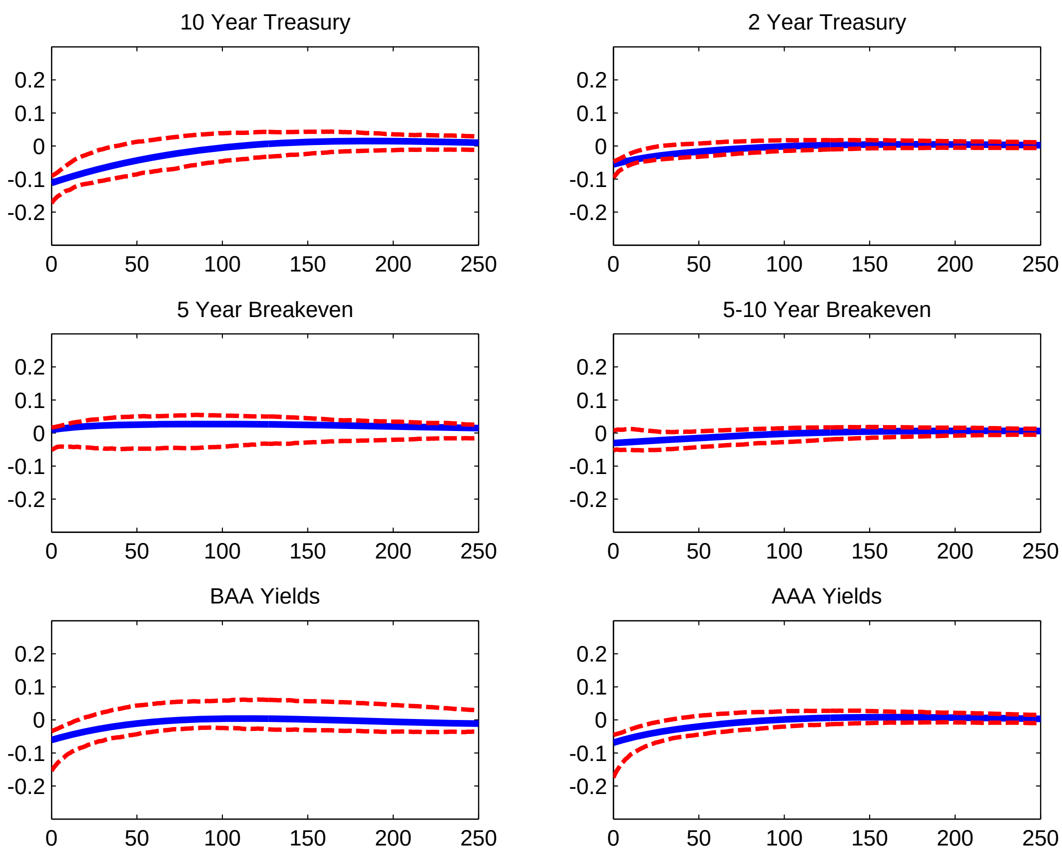
Figure 1 in the paper reported the impulse responses in the benchmark VAR, and Figures 2-6 showed the results of various robustness checks. Figure 7 then showed the impulse responses in the benchmark VAR, but using the event-study methodology of section 4. **Web appendix Figures A1-A5** give the analogs of Figure 2-6 in the paper, but using the event-study methodology. The results are quite similar to those from Figure 2-6, but the confidence intervals are generally a lot tighter.

Table A1: Estimates of the instantaneous effects of monetary policy surprises from one-day changes in interest rates

	Estimate	90 percent Confidence Interval
10 year Treasury	-0.25	(-0.25,-0.25)
2 year Treasury	-0.04	(-0.16, 0.01)
5 year Breakeven	-0.01	(-0.10,0.13)
5-to-10 year Breakeven	-0.15	(-0.20,0.14)
BAA Yields	-0.27	(-0.36,-0.07)
AAA Yields	-0.27	(-0.38,-0.07)

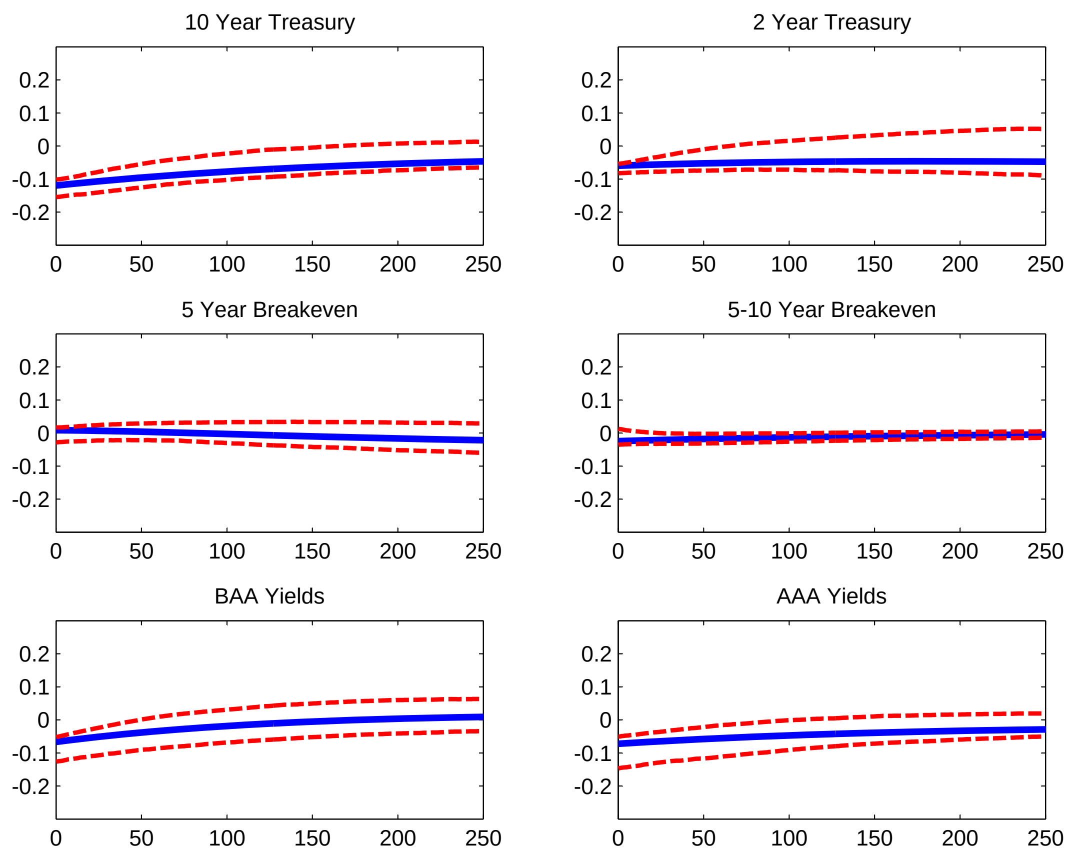
Notes: This table reports the instantaneous effects of monetary policy surprises taking one day changes in interest rates as the reduced form forecast errors in the system consisting of two- and ten-year Treasury yields, five and five-to-ten-year forward breakevens and BAA and AAA yields. The variance-covariance matrices of these one-day changes are computed on announcement and non-announcement days, and are then used to infer the instantaneous impulse responses.

Figure A1: Estimated Impulse Responses Using only 13
Announcement Days and Event-Study Identification



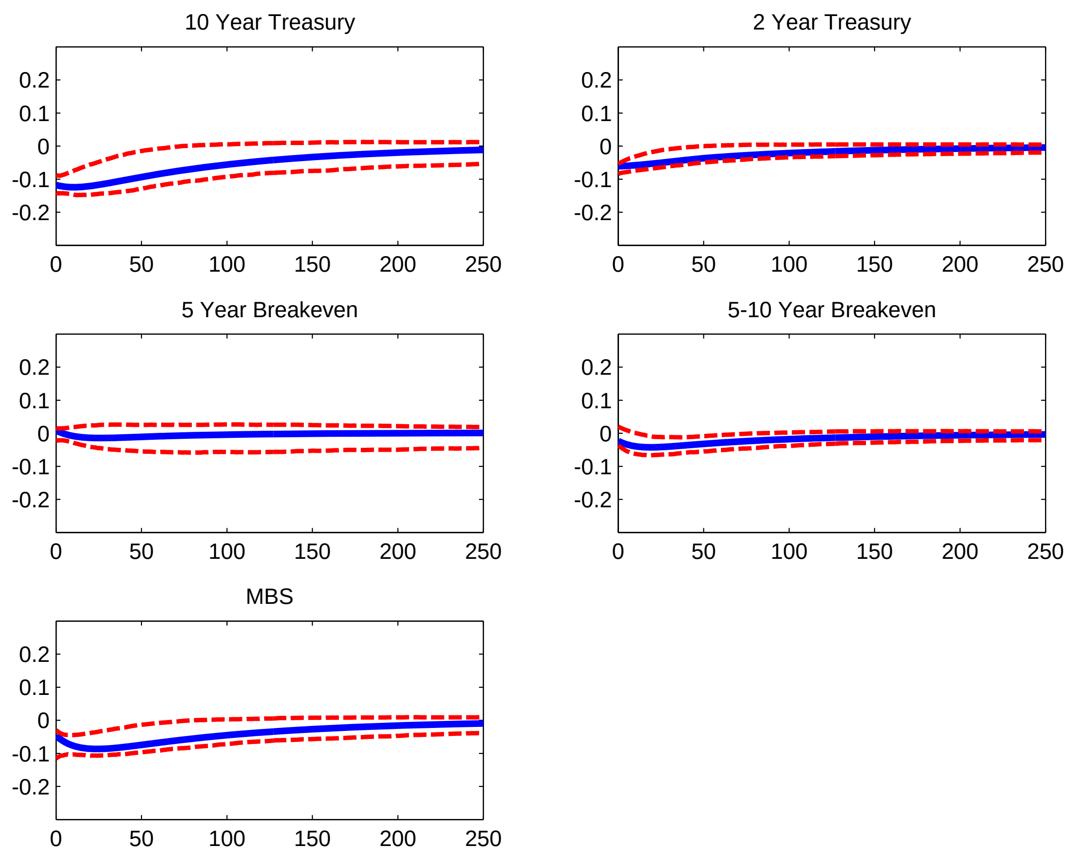
Note: As for Figure 7, except that only the 13 days highlighted in bold in Table 1 are treated as announcement days.

Figure A2: Estimated Impulse Responses Using Longer Sample
to Estimate VAR and Event-Study Identification



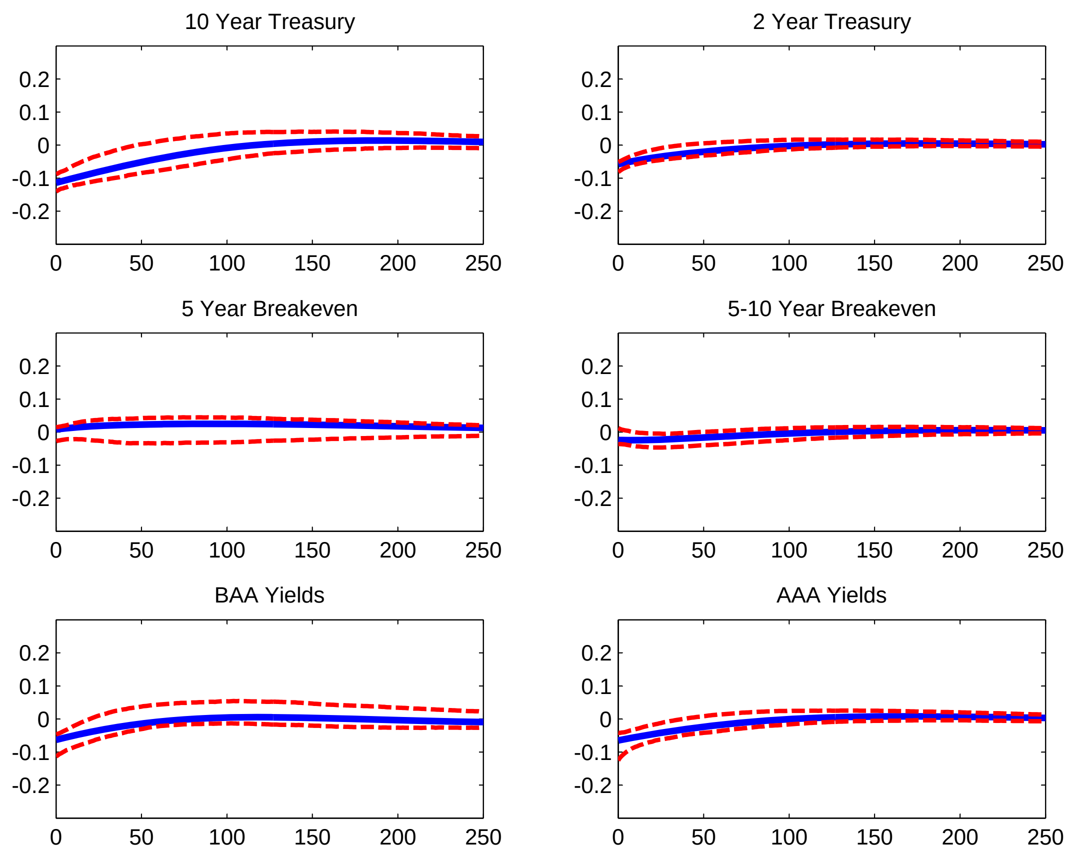
Note: As for Figure 7, except that the reduced form VAR was estimated over the period since January 1999, as described in the text.

Figure A3: Estimated Impulse Responses Using Event-Study Identification in Alternative VAR with MBS Rates



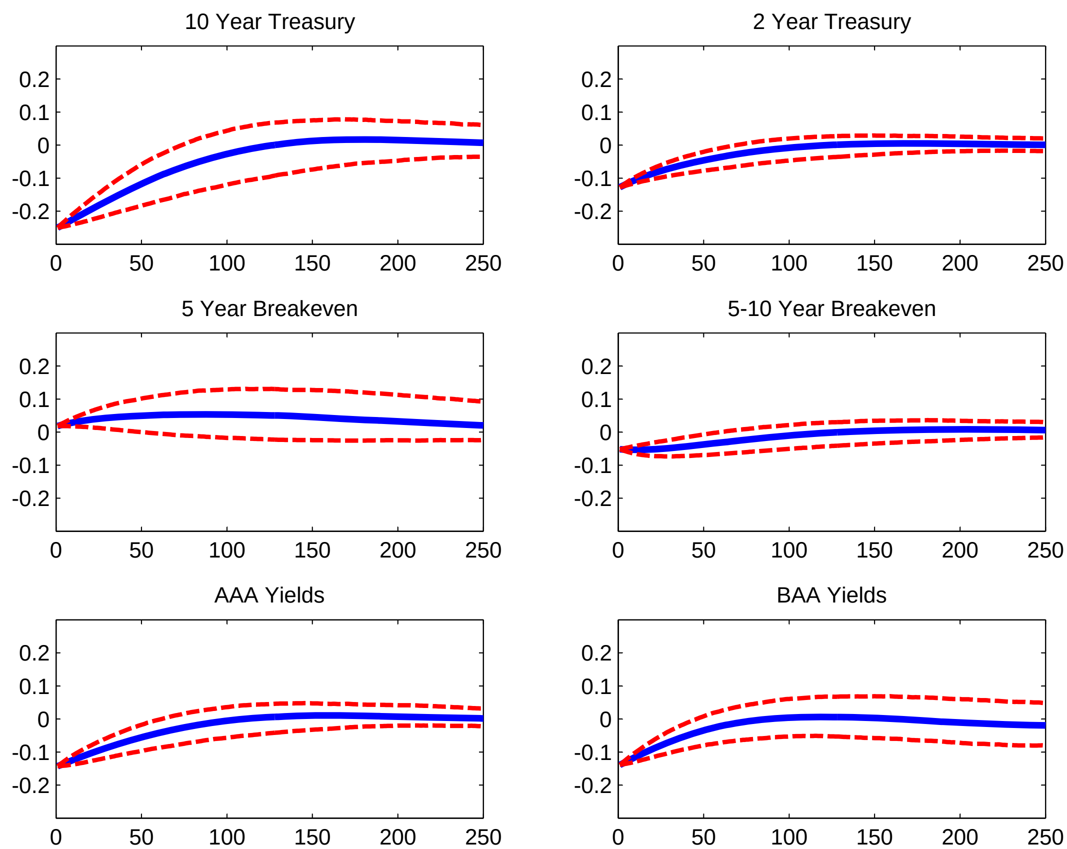
Note: As for Figure 7, except that the reduced form VAR included Fannie Mae current coupon MBS yields instead of corporate bond rates.

Figure A4: Estimated Impulse Responses Using Minnesota Prior



Note: As for Figure 7, except that the reduced form VAR is estimated as the posterior mean corresponding to the Minnesota prior of Doan, Litterman and Sims (1984) with a shrinkage parameter of 1.

Figure A5: Posterior for Impulse Responses Using Normal-Inverse Wishart Prior



Note: As for Figure 7, except that the figure shows the mean and 5th/95th percentiles of the posterior distribution of the impulse responses with the normal-inverse Wishart prior, approximated using Gibbs sampling.