Online Appendices for
"What Does Anticipated Monetary Policy Do?"

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Appendix A. Derivation of Results in the NK Model

Given the model of Section 2, one can solve forward to obtain a solution for time-t inflation, output, and the short-rate as a function of the current policy stance ξ_t and an infinite-order moving average of the future policy innovations that are expected at time t:

$$\pi_t = \psi_{0,\pi}\xi_t + \sum_{h=1}^{\infty} \psi_{h,\pi} a_t^{t+h} \qquad y_t = \psi_{0,y}\xi_t + \sum_{h=1}^{\infty} \psi_{h,y} a_t^{t+h} \qquad i_t = \psi_{0,i}\xi_t + \sum_{h=1}^{\infty} \psi_{h,i} a_t^{t+h} \quad \text{(A.1)}$$

The effects of unanticipated shocks u_t in this model are standard and are the same regardless of whether the anticipated component exists or not. Substituting (3) into (1) and (2) and rearranging gives output as a function of expected future values and ξ_t:

$$y_t = \frac{(1-\phi_\pi\beta)\mathrm{E}_t[\pi_{t+1}] + \sigma\mathrm{E}_t[y_{t+1}] + r^* - \xi_t}{\sigma + \phi_y + \phi_\pi\kappa} \quad \text{(A.2)}$$

We define the multiplier $\psi_{0,y} = \frac{\partial y_t}{\partial v_t}$ and similarly for $\psi_{0,\pi}$ and $\psi_{0,i}$. Note that, since all of the anticipated innovations a are orthogonal to the current state, (4) implies

$$\frac{\partial \mathrm{E}_t[y_{t+1}]}{\partial \xi_t} = \rho\psi_{0,y} \quad \text{(A.3)}$$

Differentiating (1) and (2) gives a system of two linear equations in the two unknown multipliers:

$$\psi_{0,\pi} = \beta\rho\psi_{0,\pi} + \kappa\psi_{0,y} \quad \text{(A.4)}$$

$$\psi_{0,y} = \frac{(1-\phi_\pi\beta)\rho\psi_{0,\pi} + \sigma\rho\psi_{0,y} - 1}{\sigma + \phi_y + \phi_\pi\kappa} \quad \text{(A.5)}$$

Solving these two equations simultaneously gives the effects of unanticipated shocks:

$$\psi_{0,\pi} = -\kappa\Lambda \quad \text{and} \quad \psi_{0,y} = -\left(1-\beta\rho\right)\Lambda \tag{A.6}$$

where $\Lambda = \left[\kappa\left(\phi_\pi - \rho\right) + \left(1-\beta\rho\right)\left(\phi_y + \sigma(1-\rho)\right)\right]^{-1}$. Substituting (A.6) into the policy rule and taking the derivative with respect to υ_t also gives

$$\psi_{0,i} = \left[\left(1-\rho\right)\left(1-\beta\rho\right)\sigma - \kappa\rho\right]\Lambda \tag{A.7}$$

Equations (A.6) and (A.7) reproduce the results in Gali (2015). Since $\phi_\pi > \rho$, $\psi_{0,\pi}$ and $\psi_{0,y}$ are necessarily negative. For $\psi_{0,i}$ to be positive requires $\left(1-\rho\right)\left(1-\beta\rho\right)\sigma > \kappa\rho$. Sufficient for this is $\sigma > \kappa/(1-\beta)$, which is satisfied under standard parameterizations.

To find the ψ_h at longer horizons, note that, since ξ_t is only backward-looking, the multipliers on a_t^{t+1} are simply the derivatives of π_t, y_t, and i_t with respect to the one-period-ahead expectations. Indeed, by iterating forward, we obtain that, at any horizon $h > 0$, the multipliers are given by the recursion:

$$\begin{pmatrix} \psi_{h,\pi} \\ \psi_{h,y} \end{pmatrix} = \mathbf{R} \begin{pmatrix} \psi_{h-1,\pi} \\ \psi_{h-1,y} \end{pmatrix} \tag{A.8}$$

where

$$\mathbf{R} = \frac{1}{\sigma + \phi_y + \phi_\pi\kappa} \begin{pmatrix} \beta(\sigma+\phi_y)+\kappa & \sigma\kappa \\ 1-\beta\phi_\pi & \sigma \end{pmatrix}$$

In addition,

$$\psi_{h,i} = \phi_\pi \psi_{h,\pi} + \phi_y \psi_{h,y}.$$

Given the admissible values of the parameters, all elements of $\mathbf{R}$ are necessarily positive, except the bottom-left. That element is positive if and only if $\phi_\pi < 1/\beta$. Consequently, for arbitrary values of ϕ_π and β, $\psi_{h,y}$ may take either sign for any $h > 0$, and $\psi_{h,\pi}$ may take either sign for any $h > 1$.

In the model described above, when agents revise their policy expectations h periods ahead by η_t^h, their expectations of the economic variables h periods ahead react as follows:

$$\Delta E_t\left[\pi_{t+h}\right] = \psi_{0,\pi}\eta_t^h \qquad \Delta E_t\left[y_{t+h}\right] = \psi_{0,y}\eta_t^h \qquad \Delta E_t[i_{t+h}] = \psi_{0,i}\eta_t^h \tag{A.9}$$

Intuitively, anticipated future inflation, output, and interest rates are affected by an anticipated policy shock in the same way that current inflation, output, and interest rates are affected by a current unanticipated policy shock. Thus, an anticipated policy shock causes both $E_t\left[\pi_{t+h}\right]$ and $E_t\left[y_{t+h}\right]$ to move in the *opposite* direction of $E_t\left[i_{t+h}\right]$. This observation motivates our sign-based identification scheme in the VAR. Notably, no other shock in standard models of this type can produce this response pattern.[1]

To get a sense of the magnitudes involved and how the expectational horizon matters, Figure A.7 illustrates the immediate responses and the subsequent economic dynamics under a standard calibration. Specifically, taking periods to be quarterly (and as in Gali, 2015), let $\sigma = 1$, $\beta = .99$, $\kappa = .15$, $\phi_y = .125$, $\phi_\pi = 1.5$, and $\rho = .5$. We focus on anticipated policy shocks η_t^h that are sufficient to lower the expected h-period-ahead annualized interest rate by 10 basis points, where $h = 1, ..., 4$ quarters.

As shown in panel A, inflation rises immediately, and it rises by more the farther into the future those innovations are expected to occur. For $h = 4$ (the solid line), current quarterly inflation increases by about 1.1 percent (at an annual rate). This effect is somewhat dampened because of the systematic response of policy: the current value of the interest rate rises to offset the stimulative effects of its anticipated future declines. For this calibration, the systematic policy response is large enough to drive the output gap negative in early periods, even though the shock itself is a stimulative one. In general, in this economy, depending on the parameter values, output and inflation responses to anticipated policy shocks are ambiguous in the short run.

However, if the patterns shown in panel A resulted from deliberate policy, the central

[1] For example, a shock to expectations about future technology, which would enter through r^*, would generally move the expected short rate in the same direction as expected output and inflation. An anticipated "markup shock," which would appear as an additional stochastic term in equation (1), would generally move expected inflation and output in opposite directions.

bank would be mechanically raising rates in response to its own accommodative FG. Since this seems implausible, we consider a second, more realistic scenario: at time t, the central bank announces that it will lower the policy rate by 10 basis points in $t+h$ but also that it will maintain the rate unchanged at its $t-1$ level until that time. This is equivalent to introducing an unanticipated shock in period t and a series of anticipated innovations in periods $t+1$ through $t+h-1$ that are sufficient to offset the systematic response of the short rate. As shown in panel B, once the mechanical policy response to expected future easing is shut down, the output gap rises substantially.

Panel C shows that a similar outcome occurs if the central bank promises to lower the short rate by 10 basis points, not just in period $t+h$, but for the entirety of the period $t+1$ through $t+h$. This is closer to what central banks have done in practice, and it mirrors the FG experiments we conduct using our empirical results in Sections 5 and 6.

Summing up, the stylized NK model shows that anticipated policy shocks, as we have defined them, move expected short-term interest rates in the opposite direction of expected future output, expected future inflation, and the current short rate. We take these responses as the key identifying feature of our empirical approach.

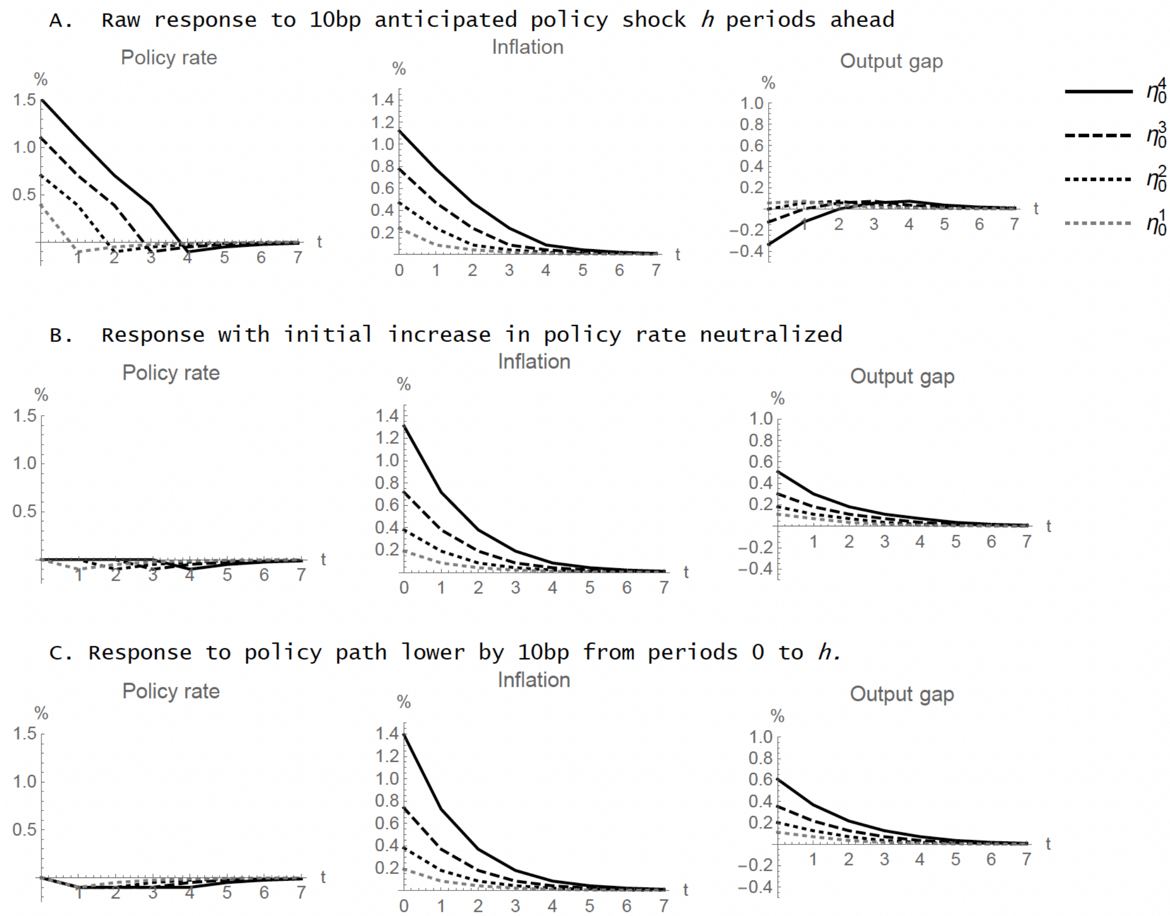

Figure A.1: Responses to Anticipated Policy Innovations in NK Model

Notes: Panel A shows how the economy in the NK model responds to an anticipated policy easing shock of 10 bp at horizon $h = 1$ to 4 quarters ahead. Because the current value of the policy rate rises endogenously in response to such a shock—an unrealistic outcome when considering forward guidance—Panel B shows how the model responds when this response is neutralized by offsetting the endogenous reaction with equal and opposite unanticipated policy shocks. Panel C shows how the results are affected when the anticipated policy is held 10 bp lower over the entire period $t + 1$ to $t + h$, rather than easing only at $t + h$, an experiment analogous to our empirical exercises.

Appendix B. Comparison with Shocks in the Literature

We gathered several measures of monetary-policy surprises used in the literature related to our study, either from the material posted for the published article or the authors' webpage. We have also computed two of the most common measures of monetary-policy surprises used in the literature, based on the changes in federal-funds futures rates around FOMC announcements at the 1-year horizon.

In detail, the measures we examine are:

- FF4: changes in the four-quarter-ahead federal funds futures contract in 30-minute windows around FOMC announcements, which (among others) is used by Gertler and Karadi (2015). February 1990-March 2020;
- MP4: FF4 adjusted according to the methodology of Kuttner (2001), February 1990-March 2020;
- S: high-frequency "forward guidance factor" estimated by Swanson (2021), July 1991-June 2019;
- MAR: quarterly FF4 shocks of Miranda-Agrippino and Ricco (2021) purified from the information effect, 1990-2009;
- BRW: monthly updated shocks from Bo, Rogers, and Wu (2021) available on the Board of Governors website, 1994-2020;
- L: monthly shocks obtained using data and methodology from Lunsford (2020), February 2000-May 2006;
- NS.O and NS.Up: high-frequency "policy news shocks" originally (O) estimated by Nakamura and Steinsson (2018), February 2000- March 2014; or subsequently updated (Up) by Acosta and Saia (2020), February 2000-September 2019. Since the methodology is based on principal components the two series cannot be spliced together;
- JK: high-frequency monetary policy shocks estimated by Jarocinski and Karadi (2020) using sign restrictions, February 1990-December 2016.

All of the above shocks are compared to our one-year-ahead anticipated policy shock, labeled DK (for D'Amico and King). To be comparable to our shock, eight of the nine measures above have been aggregated to the quarterly frequency by simply taking the sum of the shocks within the quarter. MAR was already available at a quarterly frequency.

To compare our shocks to these other measures, we begin by computing simple pairwise correlations over the respective time series. (We note that all of the shocks are available for different sample periods. We compute the correlations over the portions that overlap.) As shown in Table B.4 below, most of the correlations are very low. This result is to be expected, since our shocks are methodologically quite different—and, in most cases, conceptually different—from the nine alternative measures.

	FF4	MP4	S	MAR	BRW	L	NS.O	NS.Up	JK
DK	0.11	0.12	-0.02	0.07	0.15	-0.02	-0.07	-0.02	0.21

Table B.1: Unconditional Correlations between DK One-Year-Ahead Anticipated Policy Shocks and All Other 9 Measures of Shocks.

Of course, the low correlations raise the question of which series of shocks are plausible measures of anticipated policy shocks purged of information effects. We address the question of plausibility by checking whether the shocks generate responses in agents' forecasts for the macroeconomy that are consistent with exogenous changes in monetary policy expectations. A positive anticipated policy shock that is truly exogenous should cause agents to revise their forecasts of future interest rates upward and GDP and inflation downward. We now check whether the shocks constructed by us and the various other authors satisfy this plausibility criterion.

Specifically, we regress the revisions to the Blue Chip forecasts of the one-year average 3-month Treasury bill rate, one-year-ahead GDP level, and one-year-ahead CPI level on the 9 contemporaneous monetary-policy shocks listed above and on the DK shock. The regressions are similar in spirit to those conducted by Campbell et al. (2012) and Bu et al. (2021). Further, to make sure that the results are not driven by changes in the current short rate, rather than by expectations for future rates that are orthogonal to current policy, we control for the daily changes in the 3-month TBill rate on the days of the FOMC announcements, aggregated to quarterly frequency (TB3M).[2] (The regressions also include a constant term,

[2] We have also repeated the same exercise controlling for the 30-minute (10 minutes before to 20 minutes after) changes in FF1 (the front-month federal funds futures contract), rather than the daily TBill rate

not shown.)

All of the alternative measures of shocks rely on changes around FOMC announcements. Of course, over a quarter, we expect forecast revisions to be affected by all of the news about the macroeconomy, only a small portion of which may be contained in FOMC statements, and therefore we expect the R^2s of these regressions to be low. Nonetheless, by definition, the "surprise" component of FOMC statements should be uncorrelated with all other information received during a given quarter. Consequently, these simple regressions should still produce unbiased and consistent estimates of the response of survey forecasts to the shocks.

Table B.5 reports the results of these regressions when the revision to the forecast of the one-year average of the 3-month TBill rate is the dependent variable.[3] In this case, except for Miranda-Agrippino and Ricco (2021), all of the shock measures have the expected positive sign with respect to interest-rate forecasts. But, only our measure (DK), FF4, Swanson (2021) and Nakamura and Steinsson (2018) are statistically significant.

Tables B.6 and B.7 run the regressions using revisions to the forecasts of one-year-ahead GDP and CPI level, respectively, as the dependent variables. Our shocks have the expected negative sign and are statistically significant for both variables. Given the way our shocks are constructed, this is not very surprising.[4] Yet, remarkably, almost none of the alternative shocks have significant effects on revisions to GDP or CPI. Only the shock of Miranda-Agrippino and Ricco (2021) is negative and marginally significant in the case of the GDP revisions.

Overall, these results suggest that the shocks used in other studies may remain contaminated by measurement error (e.g., risk premia) or information effects that prevent them from exclusively capturing exogenous shifts in monetary-policy expectations. This would explain the low correlation with our shock, which is designed to capture exogenous changes

changes, and obtained very similar results. (In this case, the sample is somewhat shorter, as the high-frequency changes in FF1 are available only from February 1990.) Running the regressions without any control for changes in the short rate also yields similar results.

[3] For the regressions using our shock we have 145 rather than 147 observations as the precise dates of the FOMC announcements are available only from 1984.

[4] We do not impose this reaction on forecast revisions *per se*, but we do impose an analogous sign restriction on the responses of the forecasts themselves in the VAR, which is likely to have a similar effect.

in anticipated policy comparable to the treatment of (Odyssean) FG shocks in theoretical models.

	DK	MP4	FF4	S	MAR	BRW	L	NS.O	NS.Up	JK
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)
Shock	3.315**	0.474	0.695**	0.039**	-0.145	0.761	0.070	1.639***	1.042	0.513
	(1.384)	(0.325)	(0.321)	(0.018)	(0.427)	(0.470)	(1.119)	(0.497)	(0.656)	(0.343)
TB3M	1.858***	1.928***	1.826***	2.339***	2.264***	2.362***	3.597***	2.041***	2.426***	2.008***
	(0.254)	(0.264)	(0.257)	(0.208)	(0.273)	(0.240)	(0.843)	(0.276)	(0.310)	(0.218)
Obs.	145	121	121	113	80	105	26	78	77	108
R^2	0.276	0.498	0.508	0.546	0.519	0.513	0.577	0.583	0.574	0.501
Adj.R^2	0.266	0.489	0.500	0.538	0.507	0.504	0.540	0.572	0.562	0.492
Note:										*p<0.1; **p<0.05; ***p<0.01

Table B.2: One-Year Average 3-Month Treasury Bill Rate Revisions

	DK	MP4	FF4	S	MAR	BRW	L	NS.O	NS.Up	JK
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)
Shock	-6.309***	0.004	-0.304	0.037	-1.082*	0.230	-1.257	1.086	1.174	-0.664
	(1.487)	(0.502)	(0.500)	(0.026)	(0.632)	(0.698)	(1.172)	(0.818)	(0.920)	(0.531)
TB3M	1.423***	1.712***	1.865***	1.978***	2.059***	2.180***	4.022***	2.193***	1.765***	1.681***
	(0.273)	(0.407)	(0.400)	(0.308)	(0.403)	(0.357)	(0.883)	(0.454)	(0.435)	(0.337)
Obs.	145	121	121	113	80	105	26	78	77	108
R^2	0.289	0.203	0.205	0.284	0.256	0.278	0.535	0.331	0.291	0.192
Adj.R^2	0.279	0.189	0.192	0.271	0.237	0.263	0.495	0.313	0.272	0.176
Note:										*p<0.1; **p<0.05; ***p<0.01

Table B.3: One-Year-Ahead GDP Level Revisions

	DK	MP4	FF4	S	MAR	BRW	L	NS.O	NS.Up	JK
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)
Shock	-5.000***	-0.502	-0.438	0.029	-0.818	-0.213	-0.081	-0.250	0.696	-0.859
	(1.477)	(0.477)	(0.477)	(0.027)	(0.592)	(0.722)	(0.967)	(0.840)	(0.900)	(0.521)
TBill	0.377	1.066***	1.025***	0.789**	1.141***	0.830**	1.005	1.028**	-0.475	0.909***
	(0.271)	(0.387)	(0.381)	(0.315)	(0.378)	(0.369)	(0.728)	(0.466)	(0.425)	(0.331)
Obs.	145	121	121	113	80	105	26	78	77	108
R^2	0.103	0.067	0.065	0.064	0.106	0.047	0.115	0.067	0.017	0.073
Adj.R^2	0.090	0.051	0.049	0.047	0.082	0.029	0.038	0.042	-0.009	0.055

Note: $^{*}p<0.1$; $^{**}p<0.05$; $^{***}p<0.01$

Table B.4: One-Year-Ahead CPI Level Revisions

Appendix C. Impulse-Responses for Variables in First Differences

Figure C.8 shows the IRFs for the macroeconomic variables in the first difference from the baseline VAR and for the key experiments run in this study. These IRFs, even if not directly comparable to those shown in Figure A.7 as we use GDP rather than the output gap, are still a useful term of comparison relative to theoretical NK models. We note that, because we report medians, which are not linear transformations, the solid lines in these graphs do not exactly equal the first differences of the solid lines in the figures of the paper.

The first row of the figure shows the IRFs of GDP growth, inflation, and hours growth to the baseline anticipated monetary-policy shock; the second row shows the IRFs of the same variables to the unanticipated monetary-policy shock; the third row shows the IRFs for the experiment equivalent to that shown in Figure 4, with the IRFs to fully-credible FG in black and those to the unanticipated policy in red; the fourth row shows the fundamental (black) and noise (red) IRFs; and the fifth row contrasts the IRFs for the fully-credible FG scenario (black), partially-credible FG scenario (blue), and unanticipated-policy scenario (red).

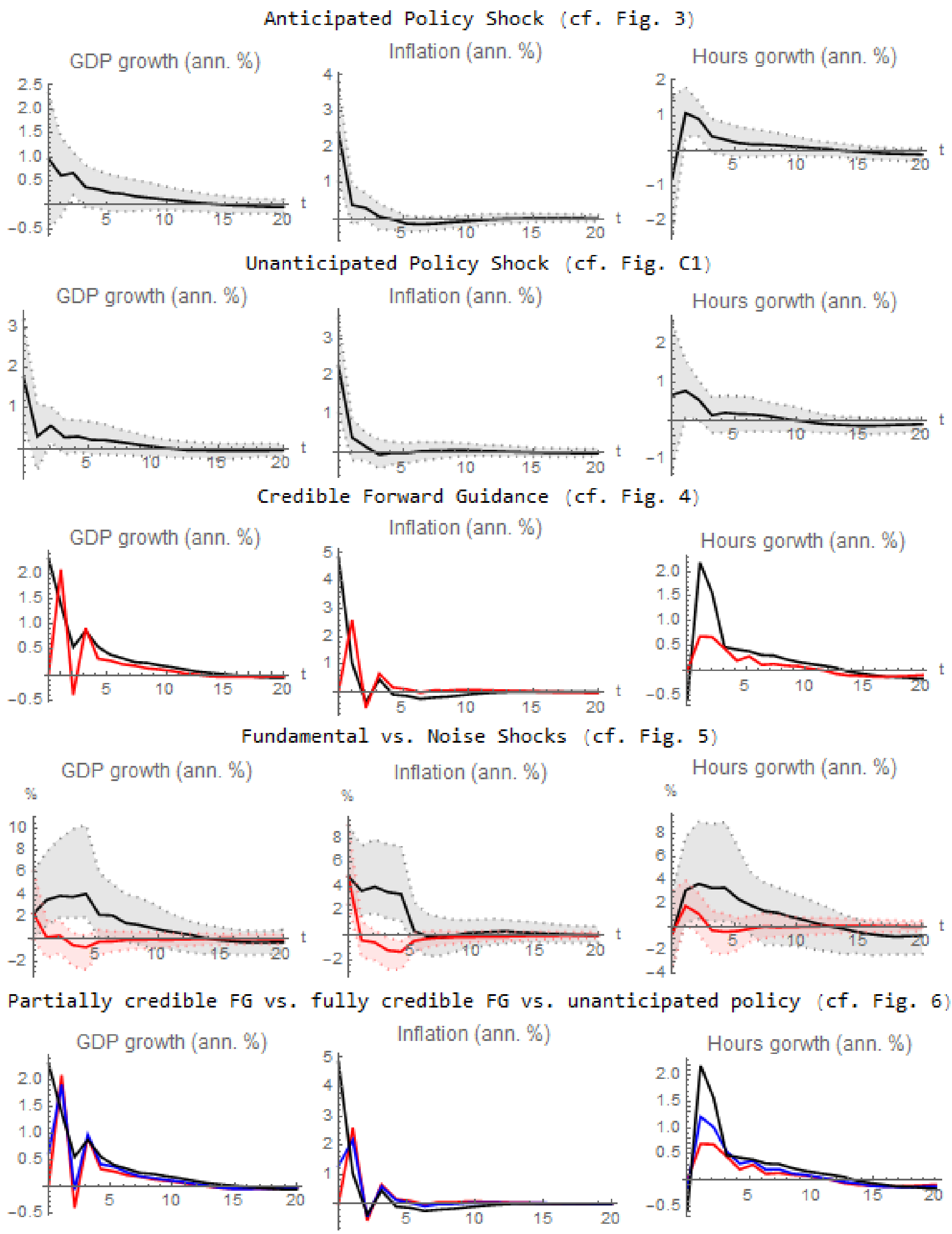

Figure C.2: Impulse-Responses in First Differences to Anticipated Policy Innovations

Notes: The figure shows the main results in the paper for the first differences of the economic variables. The first two rows are the responses to an anticipated and unanticiapted policy shocks, respectively, in our baseline model, with 16-84% credible bands. The third row is the credible FG exercise of Section 5, where the black line is the response to credible FG and the red line is the response to the unanticipated policy path. The fourth row is the decomposition of Section 6.1, with the response to fundamental shocks in black and the response to noise in red. The last row shows the difference between fully credible FG (red), partially credible FG (black), and unanticipated policy (blue), as in Section 6.2.

Appendix D. Baseline Impulse-Responses to Unanticipated Policy Shocks

Figure D.9 shows the IRFs to the unanticipated policy shocks. These shocks are produced within the same model depicted in Figure 3, using identifying restrictions that differ from the anticipated policy shocks only in the contemporaneous response of the current TBill rate, which here must decline at impact. Our median estimate is that a one-standard-deviation unanticipated policy shock lowers the actual short rate by about 9 basis points. This is considerably smaller than the size of unanticipated monetary-policy shocks typically estimated in VAR models (especially at a quarterly frequency), and this result can be attributed to the inclusion of the survey data, which helps the VAR predicting the one-step-ahead short rate with a relatively high degree of accuracy. The unanticipated policy shock also moves average short-rate expectations by about 9 basis points on impact, and those expectations continue to move in lockstep with the actual TBill rate series over the projection period. GDP and CPI immediately increase by about 0.10 and 0.15 percent, respectively, in response to the unanticipated policy shock, and while CPI remains around that level for the remainder of the projection period, GDP reaches a peak of about 0.25 percent after 8 quarters.

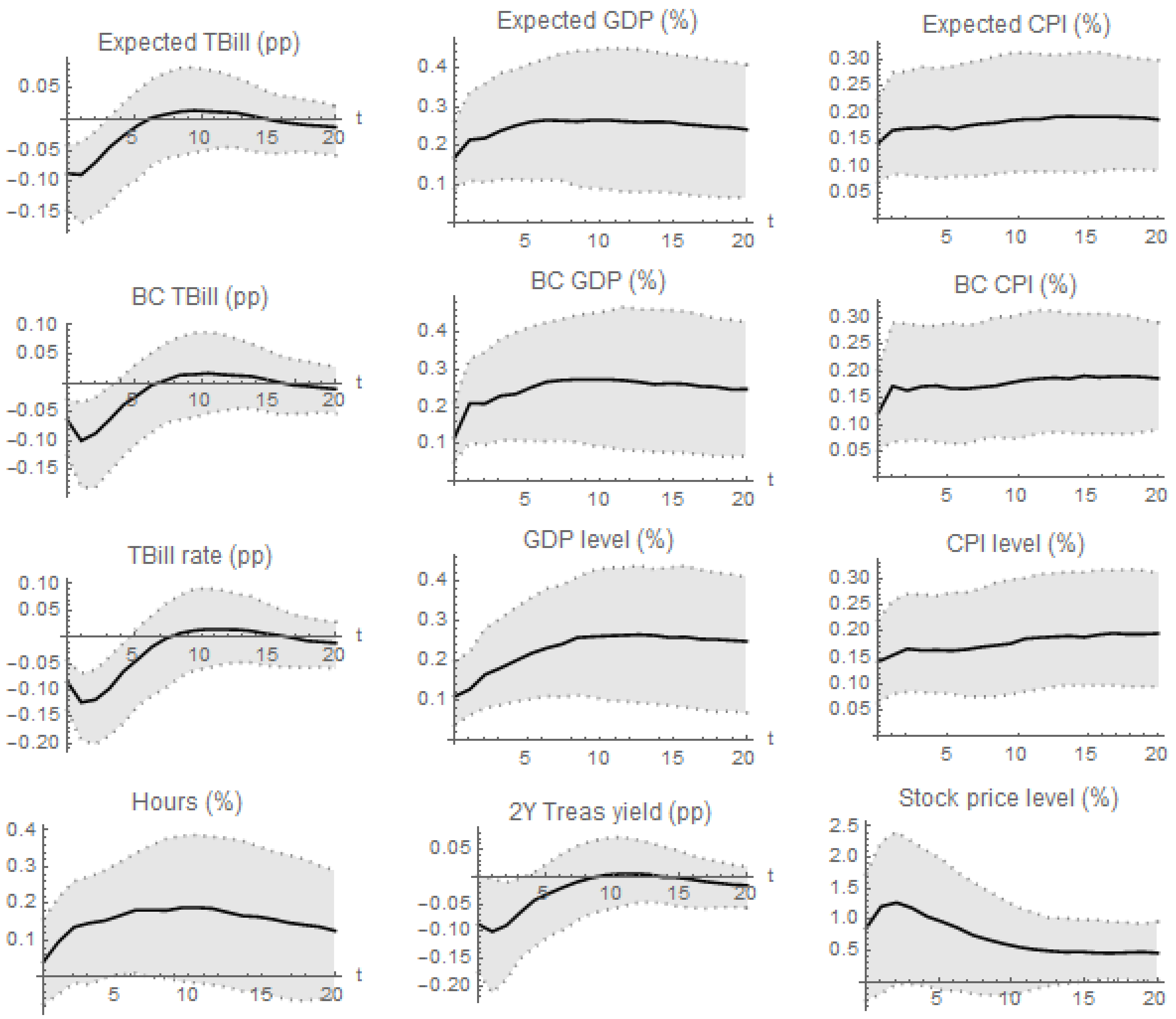

Figure D.3: Baseline Impulse Response Functions to a 1-Std Unanticipated Policy Shock

Notes: The figure shows the responses of the key endogenous variables to an unanticipated policy shock, identified as described in Table 1 of the paper.

Appendix E. Sensitivity to Key Parameters

In this Appendix, we assess the sensitivity of our results to the parameters α and δ, which reflect our identifying assumptions about the measurement and rationality of expectations. In the baseline model shown in the paper, we use the intermediate values $\alpha = 0.5$ and $\delta = 0.5$, but it is important to check that our qualitative and quantitative results do not hinge on these choices. The initial shock is set to -10 basis points as in the FG exercise in Section 5.

The range of IRFs for one-year anticipated policy shocks obtained under alternative values of α, the parameter that determines the combination of survey and VAR forecasts in our measure of beliefs, are shown in Figure E.10. We show in blue the IRFs when expectations correspond exactly to the VAR forecasts (i.e., $\alpha = 0$) and in red the IRFs when expectations correspond exactly to the survey forecasts (i.e., $\alpha = 1$). 68% credible bands for these cases are also shown. The median responses obtained under the baseline assumption of $\alpha = 0.5$, are shown in black (with credible bands omitted for clarity). The median estimated responses are little affected by the value of α. The width and skewness of the outcome distribution is affected somewhat: the credible bands obtained when $\alpha = 1$ are wider and, in particular, more skewed toward larger responses of the macroeconomic variables. Nonetheless, the key variables still respond statistically significantly to the shock, as in the baseline model.

The VAR results obtained under different values of δ, the parameter that controls the degree of rationality in the estimated model, are shown in Figure E.11. We show in blue the IRFs under the assumption of full RE (i.e., $\delta = 0$) and in red the IRFs under a flat prior for the distance between $E_t[x_{t+h}]$ and $E_t^{VAR}[x_{t+h}]$ (i.e., $\delta = \infty$). The median responses obtained under the baseline assumption of $\delta = 0.5$ are shown in black. Again, the median responses are not materially affected by the differences in δ. When there is no prior information about the divergence between measures of beliefs and VAR-implied forecasts, the credible bands are wider and skewed to the upside. This is most likely because the identification is weaker. (As mentioned in Section 1.1, the survey-consistent prior helps distinguishing between equally probable VARs identified only by the sign restrictions.) Again, however, our key results remain statistically significant even in this case.

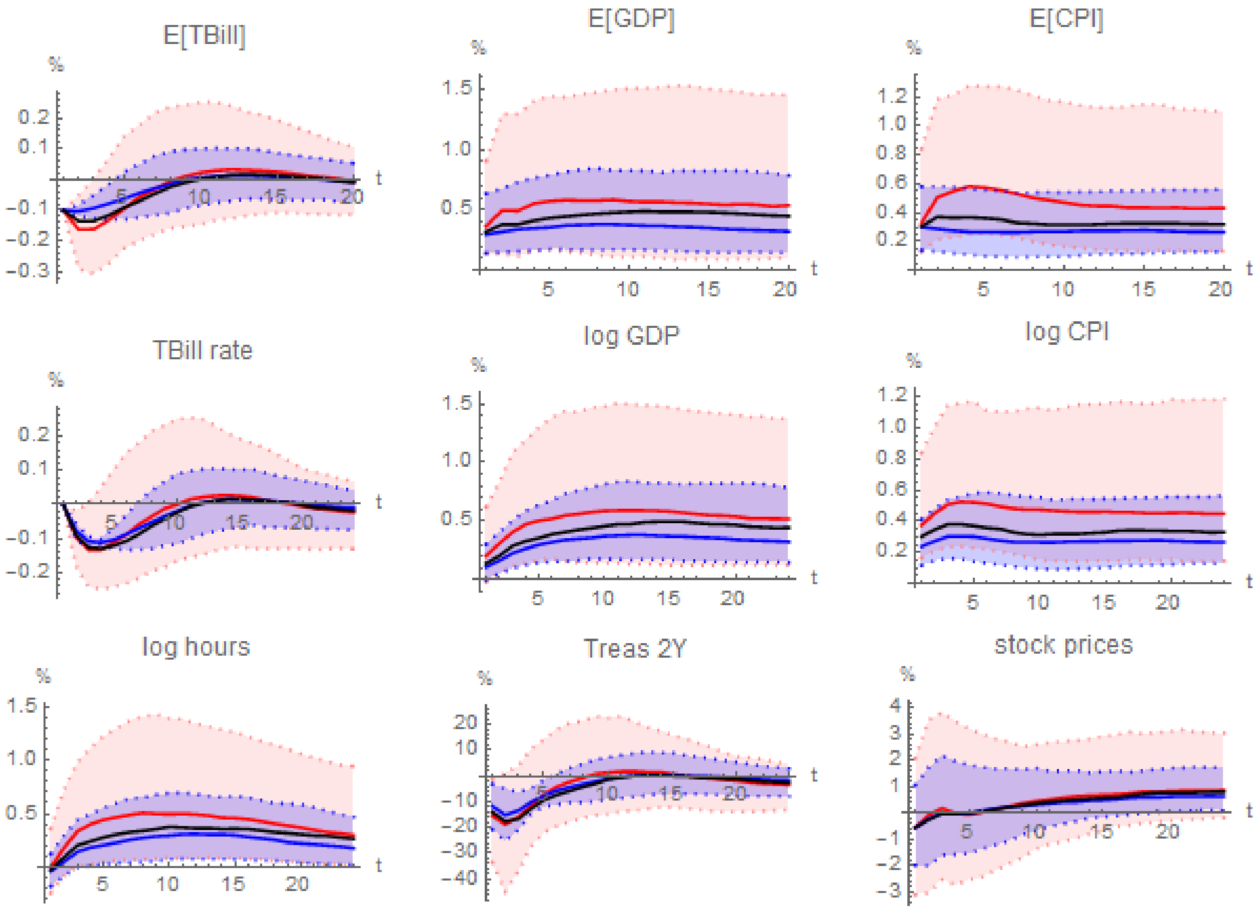

Figure E.4: Sensitivity to α

Notes: The figure shows the impulse-response functions for key variables in our model for the range of possible values of α, the parameter governing the relative weight placed on surveys versus VAR forecasts when measuring expectations. Red: $\alpha = 1$ (all weight on surveys); Blue: $\alpha = 0$ (all weight on VAR); Black: $\alpha = 0.5$ (baseline model – credibility bands not shown).

Based on these robustness exercises, we conclude that the way we approximate beliefs and impose restrictions on those beliefs does not matter for the median of the macroeconomic responses or the posterior probability that those responses are greater than zero, but it matters somewhat for the possible range of macroeconomic responses we can infer.

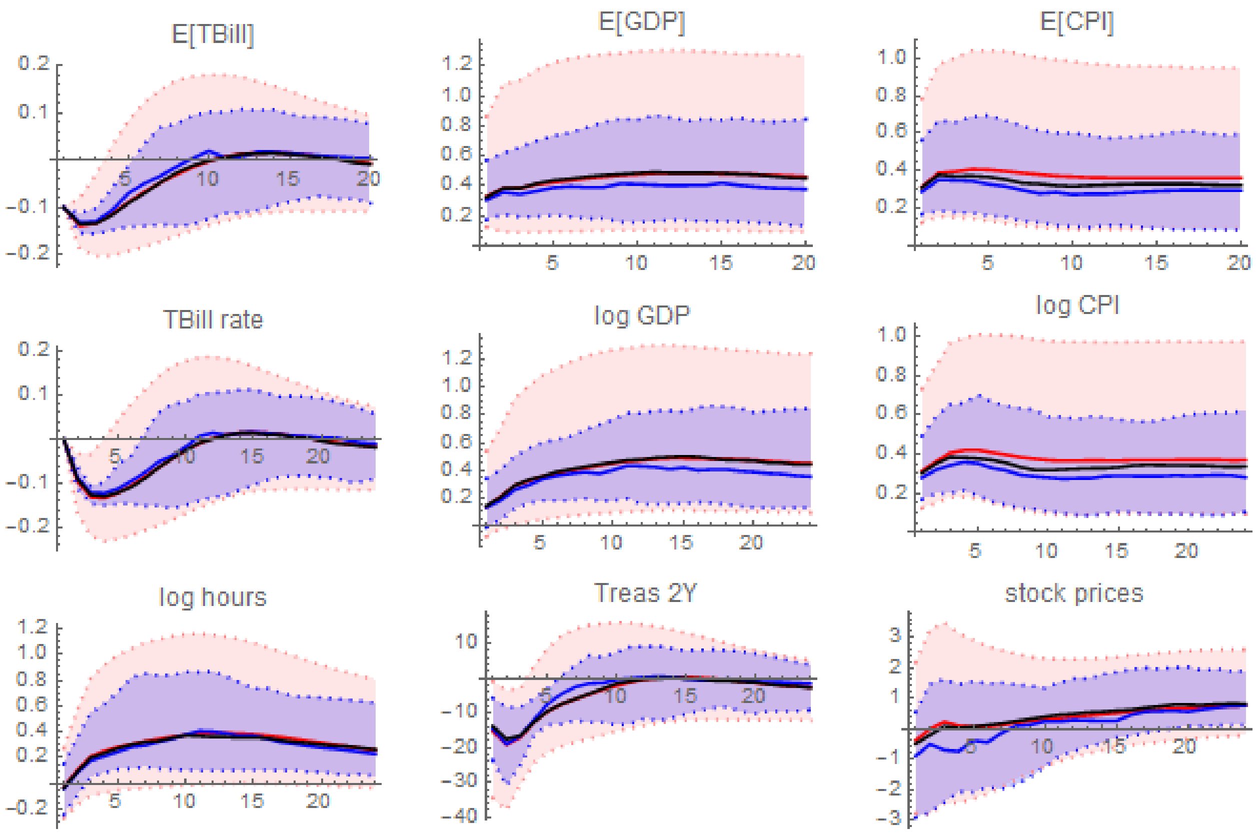

Figure E.5: Sensitivity to δ

Notes: The figure shows the impulse-response functions for key variables in our model for the range of possible values of δ, the parameter governing the prior on rational expectations. Red: $\delta = \infty$ (flat prior); Blue: $\delta = 0$ (imposes perfect rationality); Black: $\delta = 0.5$ (baseline model – credible bands not shown).

Appendix F. Zero Restriction on the Contemporaneous Policy Rate

In the case of the anticipated monetary policy shock, our baseline model uses a sign restriction to ensure that the current TBill rate moves in the opposite direction of the expected TBill rate in the period of the shock. This identifying assumption is motivated by the endogenous response of the policy rate in NK models to exogenous changes in monetary policy expectations. But one might also find it intuitive to impose orthogonality between anticipated policy and current policy rate, as some studies do since Gürkaynak et al. (2005). In this Appendix, we consider an alternative identification of our anticipated policy shock that replaces the sign restriction on the current TBill rate with a zero restriction. The other sign restrictions on the expected variables remain unchanged.

Figure F.12 compares the time series of the one-year-ahead anticipated policy shock obtained under the baseline and alternative identification schemes. It shows that the two shocks are very similar. Figure F.13 shows the IRFs to the one-year anticipated monetary-policy shocks identified with the zero restrictions; these IRFs are very similar to the baseline versions shown in Figure 3 of the paper. Similarly, Figure F.14 shows that the IRFs for the fully-credible FG scenario and the unanticipated-policy scenario, under the zero restriction, are very similar to those shown in Figure 4. Finally, Figure F.15 shows the IRFs to noise and fundamental shocks under the zero restriction, and again they are very similar to the baseline version, shown in Figure 5.

In summary, we favor our baseline identification of anticipated policy shocks because it is consistent with the way that such shocks appear in the NK model, but an alternative identification scheme that orthogonalizes anticipated policy shocks with respect to the current policy rate using a zero restriction produces very similar results (as long as it retains our sign restrictions on macroeconomic expectations).

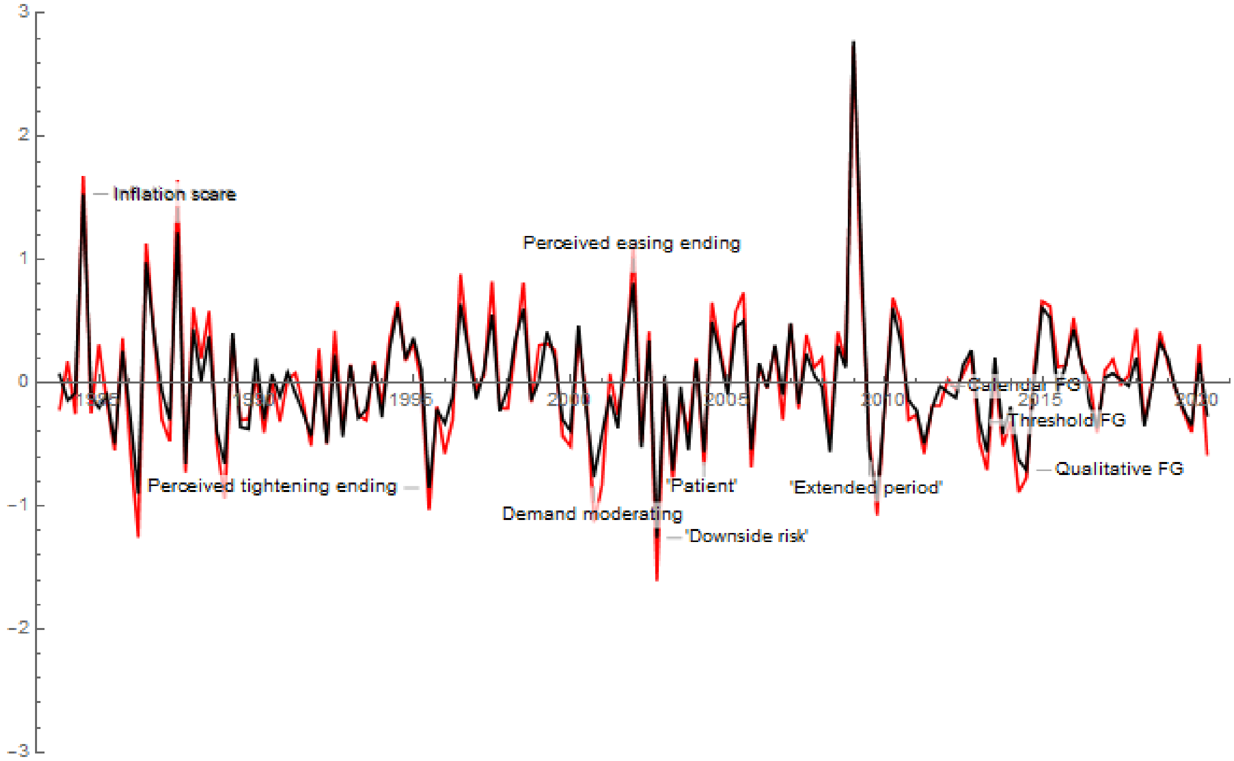

Figure F.6: One-Year-Ahead Anticipated Policy Shocks

Notes: This figure depicts the time series of the median of the one-year-ahead anticipated policy shocks obtained from the baseline VAR, shown in black, and from the VAR in which the zero restriction on the current 3-month Treasury Bill rate has replaced the sign restriction (+), shown in red. Some of the largest positive and negative shocks are marked by key words characterizing the FG statements or the Bluebook summaries, that is, reports from the staff of the Board of Governors describing intermeeting changes ahead of each FOMC.

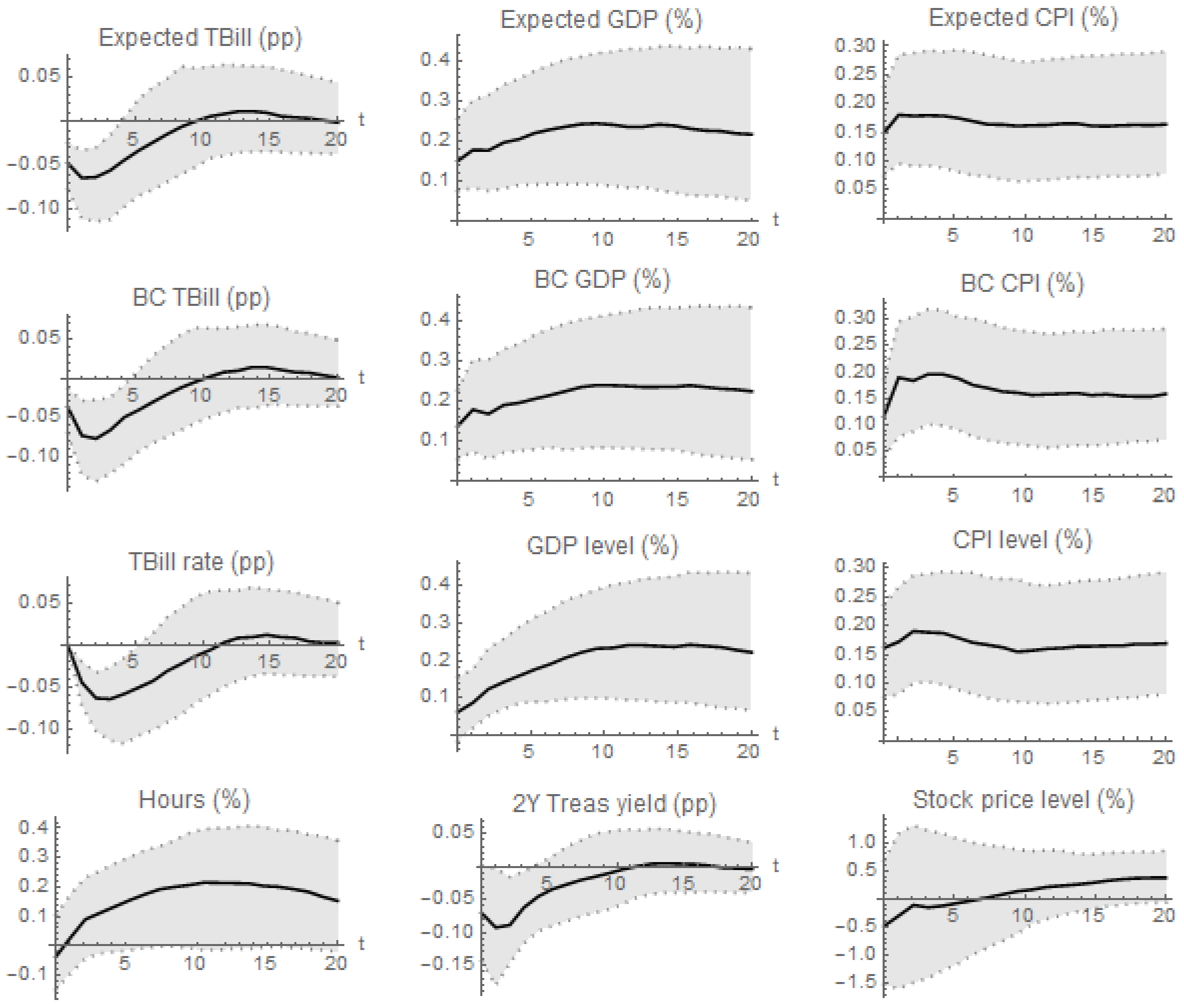

Figure F.7: Baseline Impulse Response Functions to a One-Standard-Deviation One-Year-Ahead Anticipated Policy Shock Identified with Zero Restrictions on the Current TBill Rate

Notes: The panel reports in the first row the IRFs of the expected variables derived from the combination of the survey and VAR forecasts, in the second row the IRFs of the BC survey forecasts, in the third row the IRFs of the actual macroeconomic variables, and in the fourth row the IRFs of hours worked together with the financial variables.

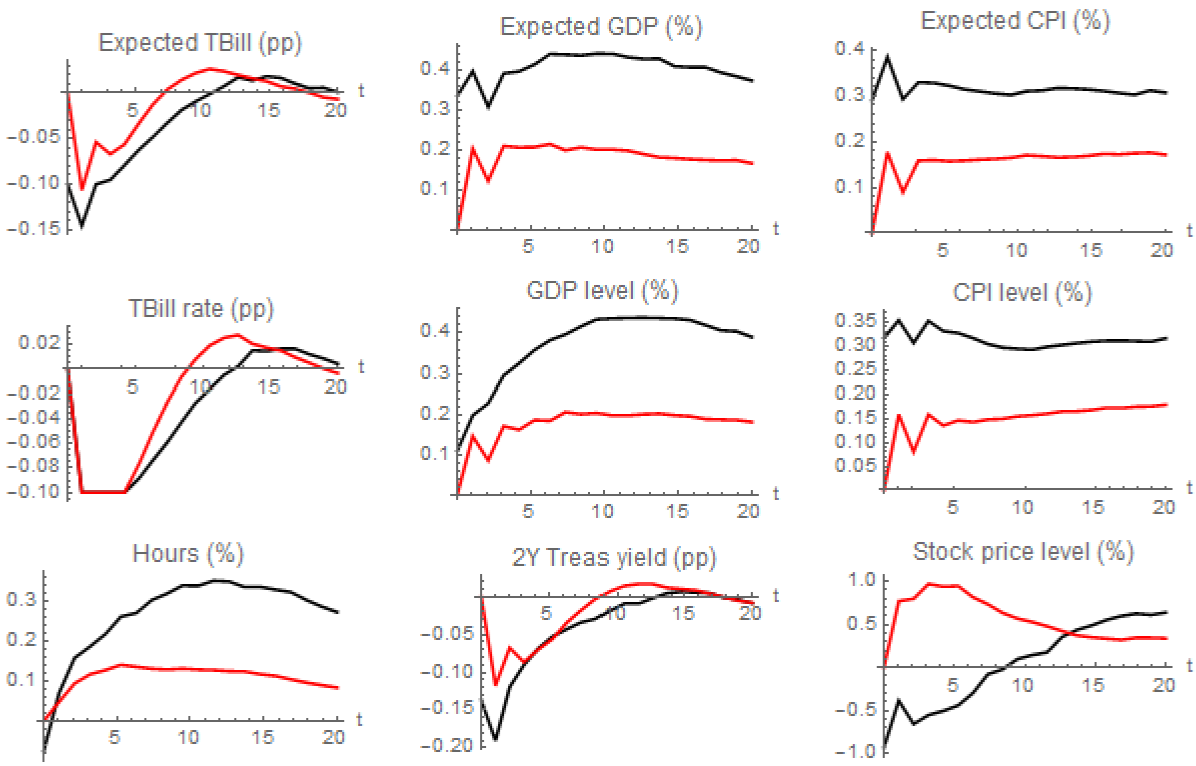

Figure F.8: Fully Credible FG (Black) vs. Unanticipated Policy (Red) in the Case of Anticipated Policy Shocks Identified with Zero Restrictions on the Current TBill Rate

Notes: The panel shows in black the IRFs of each variable in the case of fully credible FG and in red the IRFs of each variable in the case of unanticipated policy.

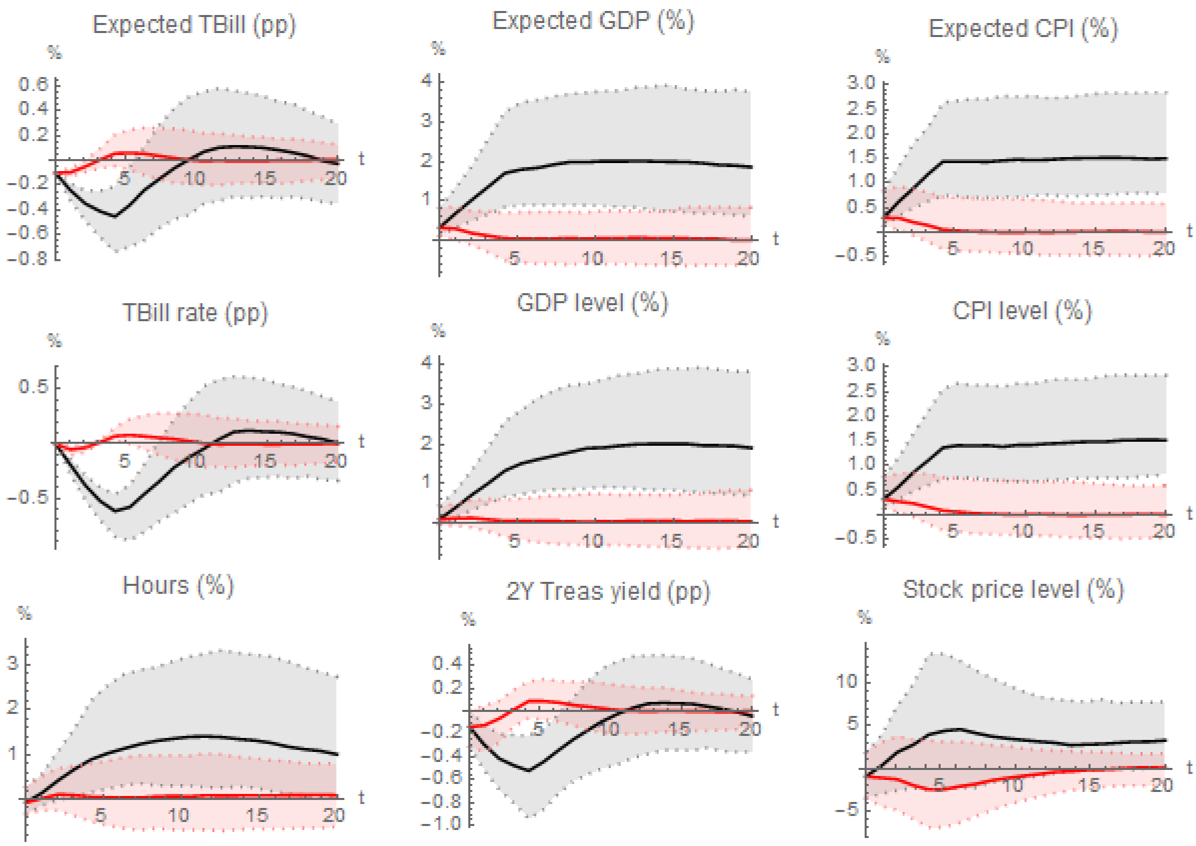

Figure F.9: Fundamental Shocks (Black) vs. Noise Shocks (Red) in the Case of Anticipated Policy Shocks Identified with Zero Restrictions on the Current TBill Rate

Notes: The panel shows in black the IRFs of each variable to future fundamental policy shocks and in red the IRFs to the noise shocks.

Appendix G. Robustness to the ZLB

In this Appendix, we analyze how our methodology is affected by the ZLB. One might be concerned about this issue because our empirical model is linear, while the ZLB introduces a clear nonlinearity that we do not explicitly account for. However, it is an empirical question whether this misspecification is material for our results.

In Figures G.16 - G.18, we report the results at the core of our study (corresponding to Figures 3 - 5 in the paper), obtained by re-estimating the model over the sample that excludes the ZLB period: 2008:Q4-2015:Q4. The omitted data constitute nearly 20% of our full sample and include some of the largest anticipated policy shocks we find in our baseline. So, naturally, the range of our results change a bit when we look only at the non-ZLB period.

Nonetheless, the broad patterns of the results remain the same as those reported in the paper. As shown in Figure G.16, GDP, CPI, and hours rise following our anticipated policy shocks. The median responses for all three variables are a bit smaller than in the baseline model, and the response of hours loses its statistical significance. But these differences are small relative to the credible intervals. (A likelihood-ratio test, not shown, cannot reject that the model parameters are the same in the ZLB and non-ZLB periods at any conventional significance level.) Our experiments on the marginal effects of credible FG (Fig. G.17) and noise vs. fundamental shocks (Fig. G.18) also tell largely the same story as in the main paper.

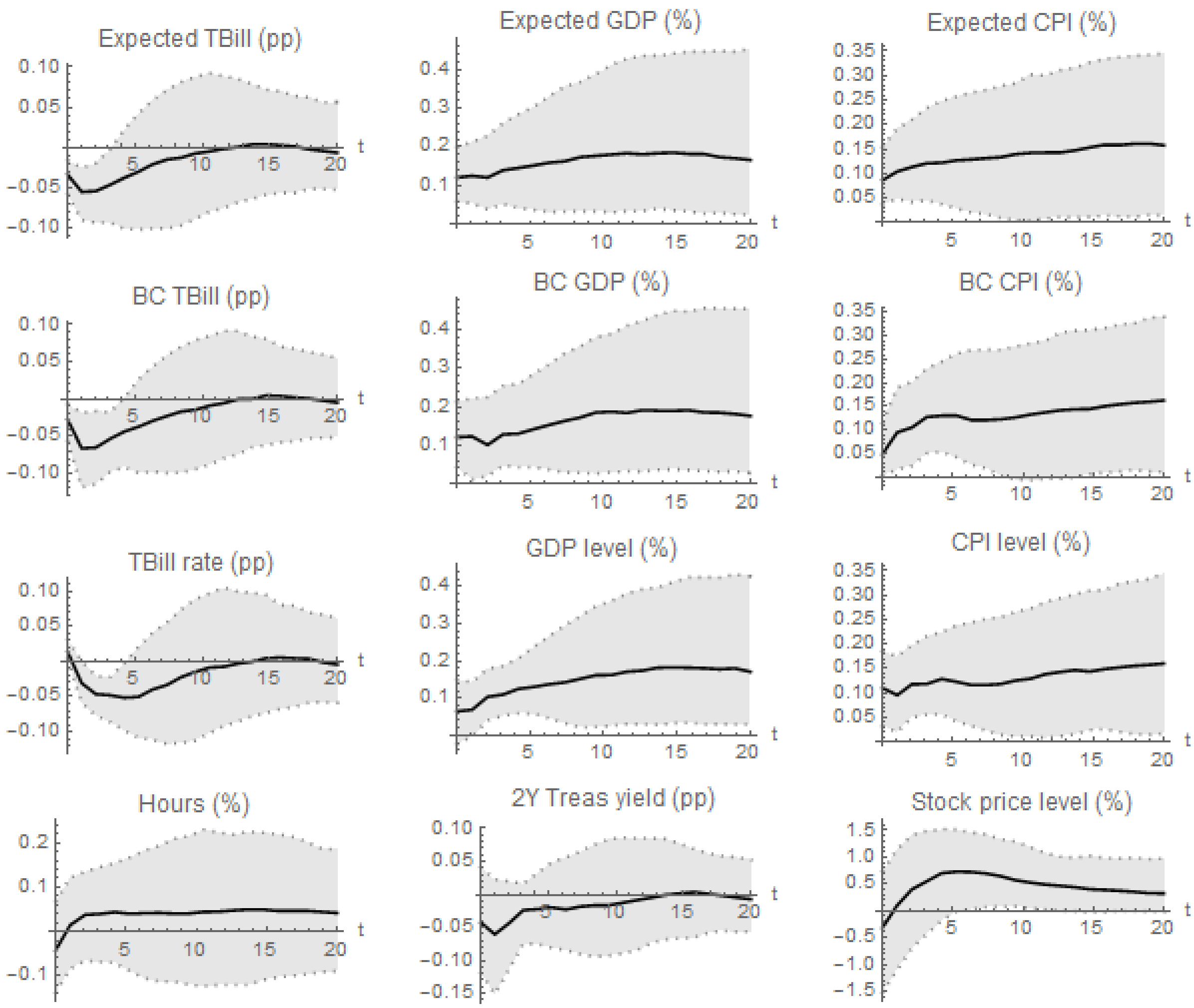

Figure G.10: IRFs to anticipated monetary-policy shocks, estimated with sign restrictions shown in Table 1, in the sample that excludes the ZLB period (2008:Q4 to 2015:Q4).

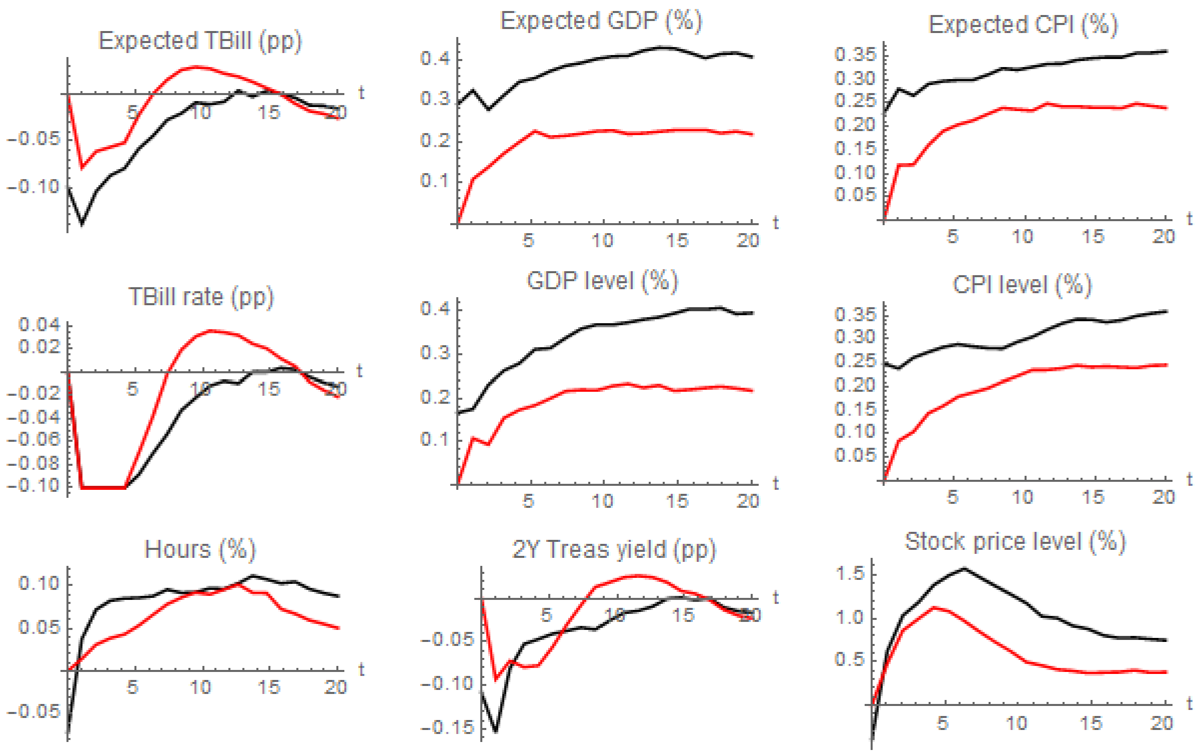

Figure G.11: IRFs for fully credible FG, in black, and for unanticipated policy, in red, estimated in the sample that excludes the ZLB period (2008:Q4 to 2015:Q4).

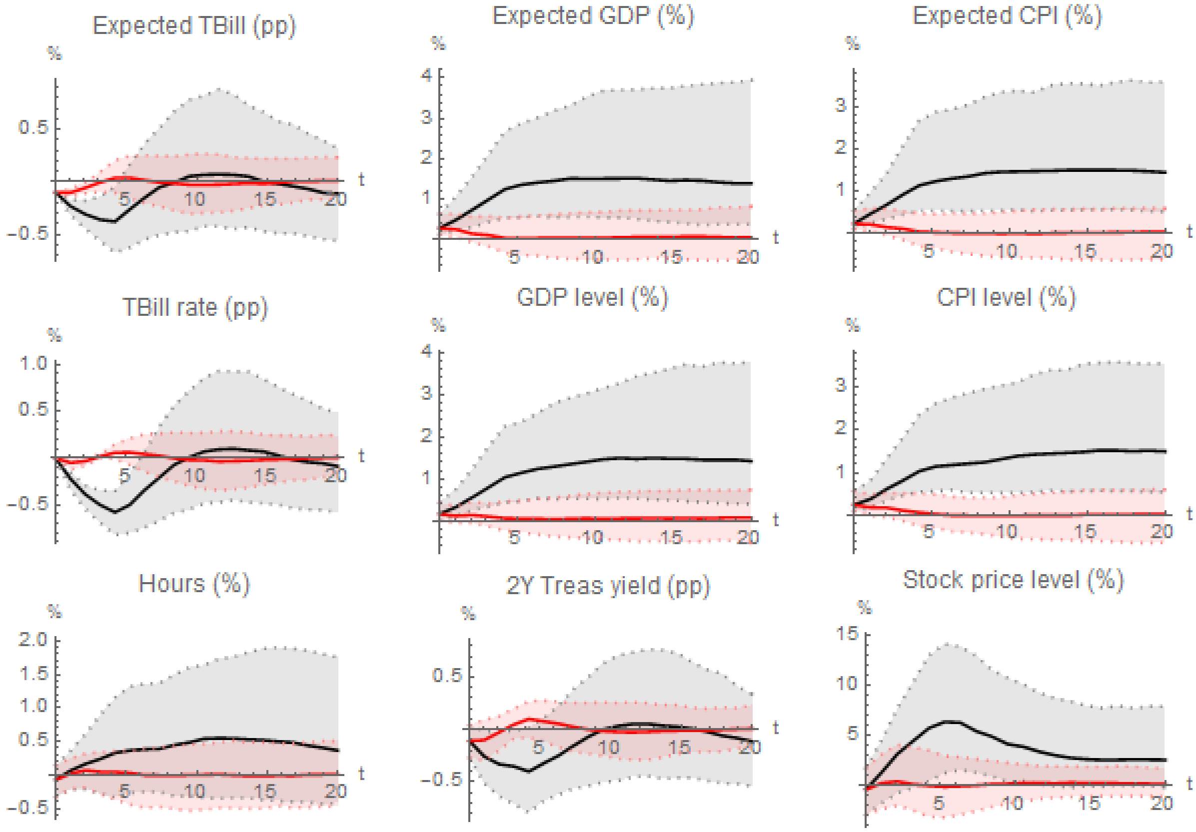

Figure G.12: IRFs to fundamental future policy shocks, in black, and noise shocks, in red, estimated in the sample that excludes the ZLB period (2008:Q4 to 2015:Q4).

Appendix H. Derivation of $\boldsymbol{K_h}$ for the multi-period case

Here we derive the equation for $\bar{K}_h$ for the case of an average of anticipated monetary-policy innovations over different horizons h, which is necessary to distinguish the IRFs to future fundamental policy shocks and noise shocks in the VAR specifications estimated in our study. An agent who is forming expectations in $t-1$ about the monetary-policy innovations over the next h quarters, faces the following unknowns: for any horizon h,

$$v_t = u_t + \eta_{t-1}^1 \tag{H.1}$$

$$v_{t+1} = u_{t+1} + \eta_{t-1}^2 + \eta_t^1 \tag{H.2}$$

$$...$$

$$v_{t+h} = u_{t+h} + \sum_{i=1}^{h+1} \eta_{t+i-1}^i \tag{H.3}$$

Because survey forecasts of the TBill rate measure the average belief over the forecasting horizon, we are constrained to work with averages, denoted by the bar. Hence, for the case of the h-quarter expectations, we have that the average anticipation in $t-1$ of the policy shock over the periods t to $t+h$ is:

$$\bar{\eta}_{t-1}^h = \bar{K}_h \bar{s}_{t-1}^h \tag{H.4}$$

where $\bar{s}_{t-1}^h$ is a signal about the average policy innovation over periods t through $t+h$. Since $\text{var}(\bar{\eta}_t^h) = \bar{K}_h \text{var}(v_t)$ and v_t is the average of the fundamental shocks shown in equations (H.1)-(H.3), we have:

$$Var(\bar{\eta}_{t-1}^h) = \bar{K}_h Var\left[\frac{1}{h}\left(\sum_{i=0}^{h} u_{t+i} + \sum_{i=0}^{h}\sum_{j=1}^{i+1} \eta_{t+j-1}^i\right)\right]. \tag{H.5}$$

Under the assumption that the anticipated monetary-policy shocks η_t^h are homoskedastic across h and over time t, (H.5) simplifies to:

$$\frac{\sigma_{\eta^h}^2}{h} = \bar{K}_h \left(\frac{h\sigma_u^2}{h^2} + \frac{h(h+1)\sigma_{\eta^h}^2}{2h^2} \right) = \bar{K}_h \frac{1}{h} \left(\sigma_u^2 + \frac{h+1}{2} \sigma_{\eta^h}^2 \right) \tag{H.6}$$

implying

$$\bar{K}_h = \frac{\sigma_{\eta^h}^2}{\left(\sigma_u^2 + \frac{h+1}{2} \sigma_{\eta^h}^2 \right)}. \tag{H.7}$$