

Appendix for Web

A Omitted Proofs

In the main body of the paper, we only analyzed the uncertainty channel for horizons $k \geq h$. We here provide a result for $k < h$. The relevant quantity that IR publication could affect here is the market's perceived variance of the central bank's month $m + k$ expectation of economic conditions in month $m + k + h$, as in equation (5).¹ There are two relevant sources of news in the IR. First, the market receives additional signals about the shocks that will hit economic conditions, which reduces variance in the forecasts of v_{m+i} for $i \leq k$. Second, since the market learns $\hat{\mu}_{m+i,m}^{\text{CB}}$ from the IR, it can also better predict $\hat{\mu}_{m+i,m+k}^{\text{CB}}$ for $k < i \leq h$ since the signals that go into forming $\hat{\mu}_{m+i,m}^{\text{CB}}$ also enter $\hat{\mu}_{m+i,m+k}^{\text{CB}}$. The uncertainty channel for $k < h$ is therefore quite straightforward to derive, and takes the form

$$\text{UNC}_m(k) = \phi^2 \left\{ \sum_{i=1}^k \rho^{2(k+h-i)} \left((s_{m+i,t}^{\text{MK}})^2 - (s_{m+i,t-1}^{\text{MK}})^2 \right) + \sum_{i=k+1}^h \rho^{2(k+h-i)} \left(\text{Var}[\hat{\mu}_{m+i,m+k}^{\text{CB}} \mid I_t^{\text{MK}}] - \text{Var}[\hat{\mu}_{m+i,m+k}^{\text{CB}} \mid I_{t-1}^{\text{MK}}] \right) \right\}.$$

Both sources of news serve to reduce the variance of future interest rates, and so $\text{UNC}_m(k) < 0$. However, the dependence of $\text{UNC}_m(k)$ on k is difficult to pin down at this level of abstraction. Characterizing this requires determining conditions under which the reduction in variance in future cyclical shocks can be compared to the reduction in variance in the central bank's future beliefs about cyclical shocks. Rather than provide such results, we interpret Proposition ?? as saying that the publication of the IR impacts the short-run term premium due to a reduction in uncertainty about short-run nominal interest rates, but that the effect need not have a clear relationship with the maturity of forward rates within the central bank's forecasting horizon.

A.0.1 Long-run effects

A.1 Proof of Proposition 1

Proof. The first step is to take the expectation of (5) conditional on I_t^{MK} . Observe that

$$\mathbb{E}[v_{m+i} \mid I_t^{\text{MK}}] = \hat{\mu}_{m+i,m}^{\text{CB}} \text{ for } i = 1, \dots, h.$$

Also, because the central bank is Bayesian, we have

$$\mathbb{E}[\hat{\mu}_{m+i,m+k}^{\text{CB}} \mid I_t^{\text{MK}}] = \hat{\mu}_{m+i,m}^{\text{CB}} \text{ for } i = 1, \dots, h; k < i.$$

¹We ignore the variance in future rates arising from ϵ_m since IR publication does not affect this.

Outside the current forecast horizon ($i > h$), we have $\mathbb{E}[v_{m+i} \mid I_t^{\text{MK}}] = \mathbb{E}[\hat{\mu}_{m+i,m+k}^{\text{CB}} \mid I_t^{\text{MK}}] = 0$ since the IR in month m contains no relevant news about cyclical shocks more than h months ahead. Expectations over them are therefore computed using the zero-mean prior distribution from which μ is drawn.

Combining these observations gives

$$\mathbb{E}[\mathbb{E}[\omega_{m+k+h} \mid I_{m+k}^{\text{CB}}] \mid I_t^{\text{MK}}] = \rho^{k+h}\omega_m + \sum_{i=1}^h \rho^{k+h-i}\hat{\mu}_{m+i,m}^{\text{CB}}.$$

By the law of iterated expectations we also obtain

$$\mathbb{E}[\mathbb{E}[\omega_{m+k+h} \mid I_{m+k}^{\text{CB}}] \mid I_{t-1}^{\text{MK}}] = \rho^{k+h}\omega_m + \sum_{i=1}^h \rho^{k+h-i}\mathbb{E}[\hat{\mu}_{m+i,m}^{\text{CB}} \mid \hat{\mu}_{m+i,t-1}^{\text{MK}}, i_m].$$

The proposition follows immediately. ■

A.2 Proof of Proposition 2

Proof. We begin with basic properties of the lognormal distribution. By expanding the stochastic process for volatility (2), we obtain

$$\log \sigma_{m+h+k}^2 = \rho_\sigma^k \log \sigma_{m+h}^2 + (1 - \rho_\sigma^k) \log \sigma_0^2 + \sum_{i=1}^k \rho_\sigma^{k-i} u_{m+h+i}$$

So $\log \sigma_{m+h+k}^2 \mid \sigma_{m+h}^2$ is normally distributed with mean $\rho_\sigma^k \log \sigma_{m+h}^2 + (1 - \rho_\sigma^k) \log \sigma_0^2$ and variance $\sum_{i=1}^k \rho_\sigma^{2(k-i)} \sigma_u^2$. Therefore we obtain

$$\mathbb{E}[\sigma_{m+h+k}^2 \mid \sigma_{m+h}^2] = \exp \left[\rho_\sigma^k \log \sigma_{m+h}^2 + (1 - \rho_\sigma^k) \log \sigma_0^2 + \frac{\sigma_u^2}{2} \sum_{i=1}^k \rho_\sigma^{2(k-i)} \right]$$

from which we obtain

$$\lim_{\rho_\sigma \rightarrow 1} \mathbb{E}[\sigma_{m+h+k}^2 \mid \sigma_{m+h}^2] = \exp \left[\log \sigma_{m+h}^2 + \frac{k\sigma_u^2}{2} \right] = \sigma_{m+h}^2 \exp \left[\frac{k\sigma_u^2}{2} \right].$$

By similar arguments

$$\lim_{\rho_\sigma \rightarrow 1} \mathbb{E}[\sigma_{m+h+k}^2 \mid \sigma_{m+h-1}^2] = \sigma_{m+h-1}^2 \exp \left[\frac{(k+1)\sigma_u^2}{2} \right].$$

We begin by characterizing the variance of (5) conditional on I_t^{MK} . First note that the variance of $\hat{\mu}_{m+i,m+k}^{\text{CB}}$ does not depend on IR publication whenever $i > k \geq h$ because the IR in month m contains no information on the central bank's forecast more than h

months ahead. It is therefore sufficient to compute

$$\text{Var} \left[\sum_{i=1}^k \rho^{k+h-i} v_{m+i} \mid I_t^{\text{MK}} \right] = \sum_{i=1}^k \rho^{2(k+h-i)} \text{Var} [v_{m+i} \mid I_t^{\text{MK}}]$$

where we can further expand

$$\text{Var} [v_{m+i} \mid I_t^{\text{MK}}] = \text{Var} [\mu_{m+i} \mid I_t^{\text{MK}}] + \text{Var} [\varepsilon_{m+i} \mid I_t^{\text{MK}}].$$

When $i \leq h$ these conditional variances are by assumption $\text{Var} [\mu_{m+i} \mid I_t^{\text{MK}}] = (s_{m+i,t}^{\text{MK}})^2$ and $\text{Var} [\varepsilon_{m+i} \mid I_t^{\text{MK}}] = \sigma_{m+i}^2$.

When $i > h$, we have $\text{Var} [\mu_{m+i} \mid I_t^{\text{MK}}] = s^2$ since no information is available on μ_{m+i} beyond the prior distribution, whose variance is s^2 . The conditional variance of ε_{m+i} can be decomposed by the law of total variance as

$$\begin{aligned} \text{Var} [\varepsilon_{m+i} \mid I_t^{\text{MK}}] &= \mathbb{E} [\text{Var} [\varepsilon_{m+i} \mid I_t^{\text{MK}}, \sigma_{m+i}^2] \mid I_t^{\text{MK}}] + \\ &\quad \text{Var} [\mathbb{E} [\varepsilon_{m+i} \mid I_t^{\text{MK}}, \sigma_{m+i}^2] \mid I_t^{\text{MK}}]. \end{aligned}$$

The second term is zero since this is the mean of the fundamental uncertainty shock in all periods. For the first term, we can use the results above to obtain

$$\lim_{\rho_\sigma \rightarrow 1} \text{Var} [\varepsilon_{m+i} \mid I_t^{\text{MK}}] = \lim_{\rho_\sigma \rightarrow 1} \mathbb{E} [\sigma_{m+i}^2 \mid \sigma_{m+h}^2] = \sigma_{m+h}^2 \exp \left[\frac{(i-h)\sigma_u^2}{2} \right].$$

Combining these results together yields²

$$\begin{aligned} \text{Var} \left[\sum_{i=1}^k \rho^{k+h-i} v_{m+i} \mid I_t^{\text{MK}} \right] &= \\ \sum_{i=1}^h \rho^{2(k+h-i)} \left((s_{m+i,t}^{\text{MK}})^2 + \sigma_{m+i}^2 \right) &+ \sum_{i=h+1}^k \rho^{2(k+h-i)} \left(s^2 + \sigma_{m+h}^2 \exp \left[\frac{(i-h)\sigma_u^2}{2} \right] \right). \end{aligned}$$

The equivalent expression for the variance conditional on I_{t-1}^{MK} is

$$\begin{aligned} \text{Var} \left[\sum_{i=1}^k \rho^{k+h-i} v_{m+i} \mid I_{t-1}^{\text{MK}} \right] &= \sum_{i=1}^{h-1} \rho^{2(k+h-i)} \left((s_{m+i,t-1}^{\text{MK}})^2 + \sigma_{m+i}^2 \right) + \\ &\quad \rho^{2k} \left((s_{m+h,t-1}^{\text{MK}})^2 + \sigma_{m+h-1}^2 \exp \left[\frac{\sigma_u^2}{2} \right] \right) + \\ &\quad \sum_{i=h+1}^k \rho^{2(k+h-i)} \left(s^2 + \sigma_{m+h-1}^2 \exp \left[\frac{(i-h)\sigma_u^2}{2} \right] \exp \left[\frac{\sigma_u^2}{2} \right] \right). \end{aligned}$$

²This expression is valid for $k > h$. For $k = h$ the correct expression is simply the first term in the sum.

The statement of the proposition then follows directly. ■

B Yield curve decomposition

Our four particular market rates can be expressed as:

1. 1-year spot rate:

$$i_{0:12,t} = \frac{i_{m(t)} + \sum_{i=1}^{11} \mathbb{E}[i_{m(t)+i} \mid I_t^{MK}]}{12} + \text{TP}_{0:12}(I_t^{MK}) \quad (\text{B.1})$$

2. 3-year forward rate:

$$f_{36,t} = \mathbb{E}[i_{m(t)+36} \mid I_t^{MK}] + \text{TP}_{36}(I_t^{MK}) \quad (\text{B.2})$$

3. 5-year forward rates:

$$f_{60,t} = \mathbb{E}[i_{m(t)+60} \mid I_t^{MK}] + \text{TP}_{60}(I_t^{MK}) \quad (\text{B.3})$$

4. 5-year, 5-year rates:

$$f_{60:120,t} = \frac{\sum_{i=60}^{119} \mathbb{E}[i_{m(t)+i} \mid I_t^{MK}]}{60} + \text{TP}_{60:120}(I_t^{MK}) \quad (\text{B.4})$$

Here we have expressed nominal rates in terms of expectations formed at a monthly frequency for notational convenience; in practice, the forward rates are computed from a fitted curve of instantaneous interest rates, and the 1-year spot and 5-year, 5-year rates are integrals under the curve.

One common way to perform an empirical decomposition of the yield curve into these two components is to use an affine term structure model. Some of these models use only the past behavior of the market yield curve to estimate the decomposition, whereas others supplement that with survey or other additional data on expectations. The specification of the model can lead to quite large differences in the estimates. In our analysis we use an average of four differently-specified models, two of which supplement the yield curve data with survey information. Specifically we use the benchmark and survey models in Malik and Meldrum (2016), the model in Vlieghe (2016), and the model in Andreasen and Meldrum (2015).

Table B.1 shows the contribution of each component to explaining the overall variance in yields on IR publication days in our sample. The term premium plays an increasingly important role in accounting for movements in interest rates at longer horizons, and is the primary driver of changes in the five-year, five-year forward rate.³

³One reason for the relatively low variance of the 1-year spot rate is that our sample includes a period in which short-maturity interest rates were at the effective lower bound.

Table B.1: Variance Decomposition of Market Interest Rate Changes

	Total Var	Var(Exp)	Var(TP)	2 x Cov
1 Year Spot	0.0032	0.0024	0.0001	0.0007
	100	75	3	22
3 Year Forward	0.0066	0.0037	0.0009	0.0020
	100	56	14	30
5 Year Forward	0.0050	0.0026	0.0015	0.0009
	100	52	29	19
5 Year, 5 Year Forward	0.0039	0.0018	0.0023	-0.0002
	100	47	59	-6

Notes: This table reports the variance decomposition of different yields by expectation and term premium components on our 70 IR release days. Var(Exp) is the variance explained by expectations; Var(TP) is the variance explained by term premiums; and Cov is the covariance between the components.

C Event study results

As discussed in the main text, we can assess the importance of long-run rate moves by examining the fractions of IR publication dates on which there are large yield moves, as shown in Table C.1.

Table C.1: Magnitude of Rate Moves on IR Days

Asset	Days	≥ 5 bps	≥ 10 bps	≥ 20 bps
$ \Delta i_{0:12,t} $	IR	0.24	0.09	0.01
$ \Delta f_{36,t} $	IR	0.46	0.20	0.03
$ \Delta f_{60,t} $	IR	0.36	0.13	0.01
$ \Delta f_{60:120,t} $	IR	0.27	0.11	0.01

Notes: This table shows the fraction of IR publication dates in our sample on which there are yield moves of at least 5bps, 10bps and 20bps.

For all yields, and despite revealing no policy actions, a quarter or more of IR publication dates lead to at least a five-basis point change, with the proportion growing to nearly a half for three-year forward rates. Moreover, movements of ten basis points are also not uncommon, and there are even occasional twenty basis point moves. All of which suggests that there is indeed meaningful variation in longer maturity rates in our sample.

As discussed in Section 2.2 in the main text, we also conduct a simple event study to assess the average market impact of IR publication and other Bank of England communications. This extends the work of Reeves and Sawicki (2007), who conduct a similar analysis on a shorter sample. We define the following events within our sample period: (1) IR publication; (2) policy rate announcement; (3) speech by MPC member; (4) release of minutes of MPC meeting.

For the event study, we classify each day in our sample of market interest rates accord-

ing to whether (1) an IR is released; (2) a policy decision from the MPC is announced; (3) an MPC member makes a public speech; (4) minutes from MPC meetings are released; or (5) none of the above. We plot kernel densities of the news (absolute value of the change) in the four yields for each of these five categories in Figures C.1a-C.1d. For one-year spot and three-year forward rates, the IR release dates appear to generate a consistently large amount of news relative to other forms of communication. For longer-horizon rates there is more similarity in the impact across communication events, but there is a mass of large tail moves in interest rates on IR publication dates not present for other communication events.

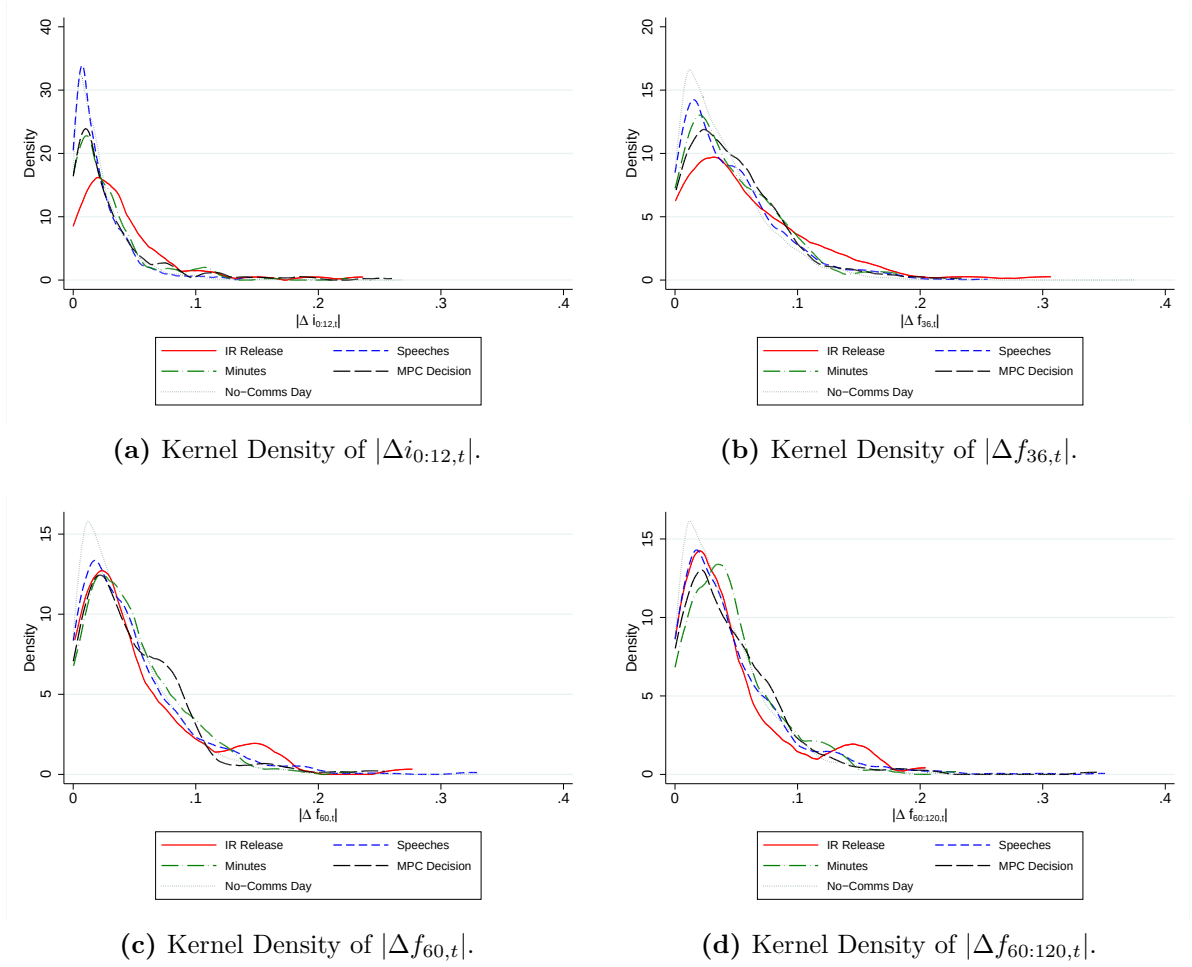


Figure C.1: Kernel Densities of Yield Changes by Type of Communication

Notes: These figures show the kernel-density distribution of changes in expected interest rates at different maturities. We use the Epanechnikov kernel, and set the half-width to the value that would minimize the mean integrated squared error if the underlying distribution were Gaussian.

More formally, we estimate the model

$$|\Delta \text{Yield}|_t = \alpha + \beta_1 D(\text{IR})_t + \beta_2 D(\text{Rate})_t + \beta_3 D(\text{Speech})_t + \beta_4 D(\text{Min})_t + \varepsilon_t \quad (\text{C.1})$$

for each yield. The estimated coefficients from ordinary least squares (OLS) estimates are in column (1) of Tables C.2a-C.3b. In columns (2)-(5) of these tables we estimate quantile regressions at various points in the distribution.

Confirming the visual evidence from the kernel densities, at shorter maturities the IR is a dominant mover of market interest rates. The OLS coefficients for the one-year spot and three-year forward rates are both highly significant and approximately twice as large as the coefficient for policy announcements. There is a drop in significance for the five-year forward rate, but the magnitude of the IR coefficient is equivalent to that for policy announcements. This suggests a lack of power given there are three times as many announcements as IR dates over the sample period. However, there is a significant effect of IR releases in the right tail, as seen in column (5). For the five-year ahead, five year forward rate there is a marginally significant coefficient in column (5), and its magnitude is again the largest of any type of communication.

Table C.2: Estimated Coefficients of Event-Study Regression

(a) 1-year spot rate					
Main Regressors	(1) $ \Delta i_{0:12;t} $	(2) $ \Delta i_{0:12;t} $	(3) $ \Delta i_{0:12;t} $	(4) $ \Delta i_{0:12;t} $	(5) $ \Delta i_{0:12;t} $
IR	0.016*** [0.000]	0.0073 [0.317]	0.014*** [0.002]	0.019** [0.013]	0.031 [0.151]
Announcement	0.0084*** [0.002]	0.00076 [0.522]	0.0023 [0.236]	0.0033 [0.394]	0.038 [0.149]
Speech	-0.0022** [0.033]	-0.0013** [0.039]	-0.0019** [0.030]	-0.0024 [0.108]	-0.0034 [0.396]
Minutes	0.0046** [0.029]	-0.0011 [0.302]	0.0019 [0.344]	0.0065** [0.035]	0.024*** [0.002]
VIX _t	0.00098*** [0.000]	0.00027*** [0.000]	0.00063*** [0.000]	0.0013*** [0.000]	0.0030*** [0.000]
Constant	0.0024* [0.093]	0.0022*** [0.001]	0.0039*** [0.000]	0.0040** [0.015]	0.0022 [0.664]
R-squared	0.121				
Quantile	OLS	.25	.5	.75	.95
Sample	All	All	All	All	All

(b) 3-year forward rate					
Main Regressors	(1) $ \Delta f_{36;t} $	(2) $ \Delta f_{36;t} $	(3) $ \Delta f_{36;t} $	(4) $ \Delta f_{36;t} $	(5) $ \Delta f_{36;t} $
IR	0.018*** [0.005]	0.0041 [0.327]	0.011 [0.137]	0.027** [0.050]	0.061*** [0.000]
Announcement	0.0071*** [0.007]	0.0027 [0.274]	0.011*** [0.000]	0.0097*** [0.004]	0.0088 [0.339]
Speech	0.0039** [0.030]	-0.0016 [0.143]	0.0025 [0.312]	0.0068*** [0.008]	0.022*** [0.005]
Minutes	0.0042 [0.109]	0.0016 [0.404]	0.0028 [0.464]	0.012** [0.031]	-0.0027 [0.591]
VIX _t	0.00092*** [0.000]	0.00025*** [0.000]	0.00091*** [0.000]	0.0013*** [0.000]	0.0030*** [0.000]
Constant	0.022*** [0.000]	0.0098*** [0.000]	0.014*** [0.000]	0.030*** [0.000]	0.045*** [0.000]
R-squared	0.053				
Quantile	OLS	.25	.5	.75	.95
Sample	All	All	All	All	All

Notes: These tables report quantile regressions to examine the effect on market interest rates according to whether (1) an IR is released, (2) a policy decision from the MPC is announced, (3) an MPC member makes a public speech, (4) minutes from MPC meetings are released, or (5) none of the above. These tables complement the kernel densities in figure C.1.

Table C.3: Estimated Coefficients of Event-Study Regression

(a) 5-year forward rate

Main Regressors	(1) $ \Delta f_{60;t} $	(2) $ \Delta f_{60;t} $	(3) $ \Delta f_{60;t} $	(4) $ \Delta f_{60;t} $	(5) $ \Delta f_{60;t} $
IR	0.0065 [0.271]	0.0019 [0.578]	-0.0039 [0.449]	0.0069 [0.557]	0.043*** [0.002]
Announcement	0.0063* [0.055]	0.0032 [0.233]	0.0059 [0.106]	0.010*** [0.004]	0.0032 [0.857]
Speech	0.0044** [0.023]	-0.00041 [0.753]	0.0030 [0.181]	0.0057** [0.042]	0.025*** [0.000]
Minutes	0.0037 [0.159]	0.0046 [0.112]	0.0050* [0.096]	0.0040 [0.283]	-0.0055* [0.075]
VIX _t	0.0010*** [0.000]	0.00026*** [0.000]	0.00071*** [0.000]	0.0014*** [0.000]	0.0028*** [0.000]
Constant	0.021*** [0.000]	0.0097*** [0.000]	0.019*** [0.000]	0.031*** [0.000]	0.052*** [0.000]
R-squared	0.052				
Quantile	OLS	.25	.5	.75	.95
Sample	All	All	All	All	All

(b) 5-year ahead, 5-year forward rate

Main Regressors	(1) $ \Delta f_{60:120;t} $	(2) $ \Delta f_{60:120;t} $	(3) $ \Delta f_{60:120;t} $	(4) $ \Delta f_{60:120;t} $	(5) $ \Delta f_{60:120;t} $
IR	0.0021 [0.688]	-0.0015 [0.592]	-0.0014 [0.798]	-0.0014 [0.889]	0.037* [0.074]
Announcement	0.0049 [0.154]	0.000084 [0.978]	0.0014 [0.641]	0.0078 [0.179]	0.0046 [0.669]
Speech	0.0035* [0.070]	-0.00050 [0.685]	3.7e-06 [0.998]	0.0026 [0.437]	0.021*** [0.000]
Minutes	0.0036 [0.158]	0.0065* [0.081]	0.0047* [0.051]	0.0043 [0.491]	-0.0012 [0.838]
VIX _t	0.00097*** [0.000]	0.00027*** [0.000]	0.00061*** [0.000]	0.0013*** [0.000]	0.0027*** [0.000]
Constant	0.021*** [0.000]	0.0094*** [0.000]	0.020*** [0.000]	0.032*** [0.000]	0.051*** [0.000]
R-squared	0.049				
Quantile	OLS	.25	.5	.75	.95
Sample	All	All	All	All	All

Notes: These tables report quantile regressions to examine the effect on market interest rates according to whether (1) an IR is released, (2) a policy decision from the MPC is announced, (3) an MPC member makes a public speech, (4) minutes from MPC meetings are released, or (5) none of the above. These tables complement the kernel densities in figure C.1.

D Numeric information

As described in Section 4.1, the numeric forecast information in the IR on day t is the forecasts for GDP growth and inflation, which form part of $\mathbb{E}[\omega_{m+h} \mid I_m^{\text{CB}}]$, and distributional information around them. In our analysis we use a set of 15 core numeric signals contained in each IR published in month m .

We take the modal growth and inflation projections, denoted g_m^{CB} and π_m^{CB} respectively. We also include the variances, $\text{Var}(g_m^{\text{CB}})$ and $\text{Var}(\pi_m^{\text{CB}})$, and skews, $\text{Skew}(g_m^{\text{CB}})$ and $\text{Skew}(\pi_m^{\text{CB}})$. Since 1998, these forecasts have been consistently conditioned on the path for the policy rate (called ‘Bank Rate’) implied by market interest rates. While projections are provided for each quarter over the forecast period, in our analysis we focus our attention on the projections at the two-year horizon as that is the horizon that has tended to be focused on in the Bank’s monetary policy communication as the one most relevant for the current stance of policy.

Rather than the rate of GDP growth g_m^{CB} , the potentially more relevant variable for interest rate expectations is the MPC’s view of the h -month ahead output gap $\tilde{y}_{m,h}^{\text{CB}}$. It may be that investors infer the MPC’s view of the future output gap from its GDP growth forecast. To measure this, we construct an implied modal output gap using the MPC’s growth forecasts together with private-sector estimates of long-run potential growth.⁴

It is also important to capture not just the IR forecast levels but also how much these deviate from market expectations of the IR forecast, since the surprise component in the forecast should be the driver of any change in market interest rates. Ideally we would compare each of the MPC’s forecast measures to equivalent expectations from the private sector. The Bank of England collects equivalent market forecasts ahead of each IR publication, and we denote the difference between g_m^{CB} and its expected value as $\text{Surp}(g_m^{\text{CB}})$, and similarly $\text{Surp}(\pi_m^{\text{CB}})$. For the variance and skew variables, we do not have measures of private-sector expectations, and we define surprise as the difference between the current and previous value of the variable.

For the output gap surprises, we include the deviation of the two-year-ahead implied output gap from the two-year-ahead implied output gap in the previous IR forecast, i.e. $\tilde{y}_{m,24}^{\text{CB}} - \tilde{y}_{m-1,24}^{\text{CB}}$. We also control for a like-for-like comparison by comparing the two-year-ahead (8 quarters) output gap forecast from the last IR with the 7-quarter-ahead output gap in the current forecast, i.e. $\tilde{y}_{m,21}^{\text{CB}} - \tilde{y}_{m-1,24}^{\text{CB}}$.

In total we obtain 15 variables associated with the numeric information in the IR communication published on day t , which we label $\mathbf{q}_t$. We divide these into two groups. The first contains seven variables that directly represent the level or news on the expectational

⁴Specifically, we grow the real GDP series implied by the forecast at the rate of long-run growth from Consensus Economics. We then pass the resulting series through a Baxter-King Bandpass filter to isolate movements between 2 and 36 quarters. The output gap estimate for the IR release in month m , $\tilde{y}_{m,h}^{\text{CB}}$, is the percentage deviation of the forecast level of real GDP from the BK-filtered trend series.

component of the forecast: the modal growth and inflation forecasts; the surprise in these forecasts relative to market expectations; the output gap; and the two measures of the evolution of the output gap from the previous IR. We denote these variables $\mathbf{q}_t^{\text{EXP}}$. The remaining eight variables represent information on the distributions around these forecasts, and broadly measure uncertainty. We label these $\mathbf{q}_t^{\text{UNC}}$. Of course, the same set of signals can operate through multiple channels if they convey, either directly or indirectly, information on both the level and uncertainty around future economic conditions.

E LDA Topics from the Inflation Report

LDA is a Bayesian factor model for discrete data. Suppose there are D documents (we treat each paragraph as a document, so $D = 15,023$) that comprise a corpus of texts with V unique terms (so here $V = 4,382$). LDA identifies K *topics* (i.e. factors), each of which is a probability vector $\beta_k \in \Delta^{V-1}$ over the V unique terms in the data. The use of probability distributions allows the same term to appear in different topics with potentially different weights. Informally, one can think of a topic as a weighted word list that groups together those words that express the same underlying theme.

Each document can belong to multiple topics. Formally, each document d has its own distribution over topics given by θ_d (i.e. factor loadings). Informally, θ_d^k is topic k 's “share” of document d . The probability that any given word in document d is equal to the v th term is therefore $p_{dv} \equiv \sum_k \beta_k^v \theta_d^k$ and the overall likelihood is $\prod_d \prod_v p_{d,v}^{n_{d,v}}$ where $n_{d,v}$ is the number of times terms v appears in document d .

Importantly, LDA reduces the dimensionality of each document substantially. In the document-term matrix, documents live in a V -dimensional space. After estimating LDA, one obtains a representation of each document in terms of the (estimated) θ_d , which lives in the $K - 1$ simplex, and in general $K \ll V$. Importantly, though, LDA does not ignore any dimensions of variation in the raw term counts since the underlying topics are free to lie anywhere in the $V - 1$ simplex.

LDA places Dirichlet priors over the β and θ probability vectors, and the inference problem is to approximate their posterior distributions. The main model selection choice is the number of topics K . We use a model with $K = 30$, which provides a generally interpretable set of topics.⁵

Our LDA estimation follows the same Markov Chain Monte Carlo procedure described in Hansen et al. (2018) and introduced by Griffiths and Steyvers (2004); we refer interested readers to those papers for full details.⁶

Figure E.1 in Appendix E represents the 30 topics that LDA estimates in our data and demonstrates that they are indeed interpretable. Topic 6, for example, appears to capture discussion of commodity prices; Topic 14 of the forecast; Topic 24 of financial markets; and so on. The appendix contains more discussion of the topics but it should be noted that although we comment on which topics drive which market interest rates below, our analysis focuses on tests that do not rely on any specific subjective labels.

⁵There is a well-known trade-off between interpretability and goodness-of-fit in the machine learning literature (Chang et al. 2009). While objective measures of goodness-of-fit can be used to determine a choice for K , our goal is to obtain an interpretable description of IR content, for which defining objective criteria is challenging.

⁶A precursor to LDA is Latent Semantic Analysis (LSA), a non-probabilistic model that applies a singular value decomposition to the matrix of term counts in a corpus. Boukus and Rosenberg (2006) and Hendry and Madeley (2010) use LSA to assess the market impact of Fed and Bank of Canada communications, respectively, but do not propose tests for the information effect.

This is important because LDA is an unsupervised learning algorithm.

While we estimate LDA at the paragraph level to exploit variation across thousands of examples of text, we follow the procedure detailed in Hansen et al. (2018) to obtain the distribution over topics in the IR published on day t , which we denote θ_t . Since changes in topic coverage can also have potentially important market effects, we also include $\delta_t \equiv \theta_t - \theta_{t-1}$ to obtain a 60-dimensional representation of the text information in each IR —the 30 topic levels (later denoted ‘L’) and the 30 changes (denoted ‘D’).

A final point is that LDA topics do not necessarily have a directional interpretation. When discussing inflation, the IR could be referring to increasing or decreasing inflation. In the baseline analysis below, we sign the topics following the procedure used in Hansen and McMahon (2016) and Thorsrud (2018). Essentially we identify the main topic of each paragraph and then count the contractionary and expansionary sentiment in that paragraph for that topic using dictionaries specific to monetary policy as in Apel and Blix Grimaldi (2012) and Hansen and McMahon (2016). We then aggregate expansionary and contractionary topic counts across paragraphs and use the resulting measures ($n_{k,t}^+$ and $n_{k,t}^-$) to form IR-specific, topic level sentiment balance measure (and its first difference $\delta_{t,k}^\pm$):

$$\theta_{k,t}^\pm = \frac{n_{k,t}^+ - n_{k,t}^-}{n_{k,t}^+ + n_{k,t}^-}. \quad (\text{E.1})$$

Figure E.1 shows the highest probability words in each topic. Since topics have no natural ordering, we define our own based on whether an IR is published during a cycle of rate increases (i.e. the previous rate change was an increase) or rate decreases (i.e. the previous rate change was a decrease). For each topic, we compute its average share of time in the IR during both cycle, and order topics based on the difference. Topic 0, about the pace of wage and labour cost growth, is most associated with an increasing rate cycle. While Topic 29, financial market conditions, which were of primary concern during the crisis, is most associated with a decreasing cycle.

To further illustrate LDA output, Figure E.2 plots two representative topic shares within the Inflation Report as well as an alternative representation of these topics in terms of word clouds. Topic 15 reflects discussion of labor markets. This was fairly stable until 2014, when the Bank started increasing its analysis of the labor market in response to the puzzle that domestic inflationary pressure had remained subdued even as unemployment fell. Topic 26 about demand had a marked increase at the onset of the financial crisis, and has remained high reflecting the MPC’s concerns about the pace of the recovery.

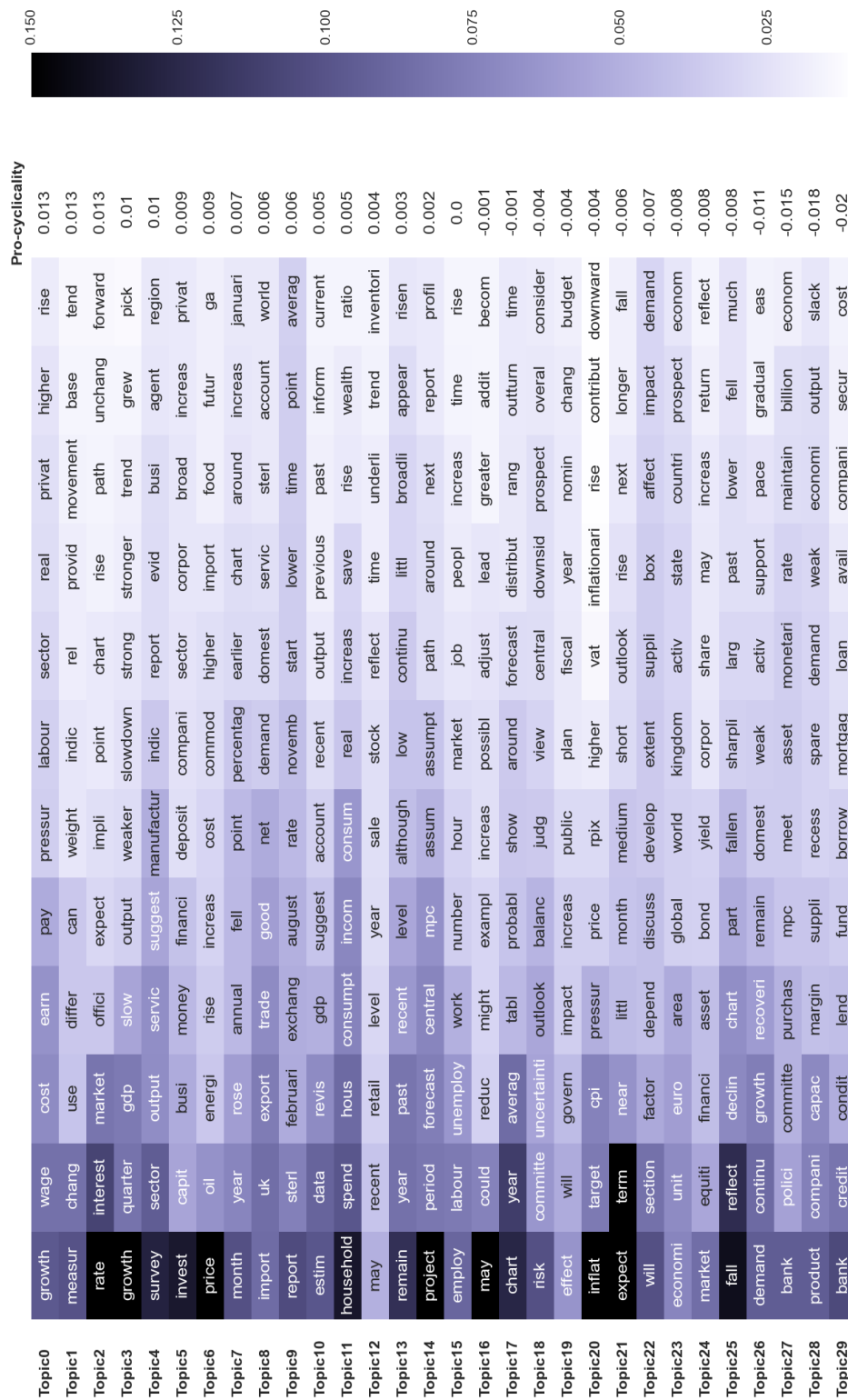
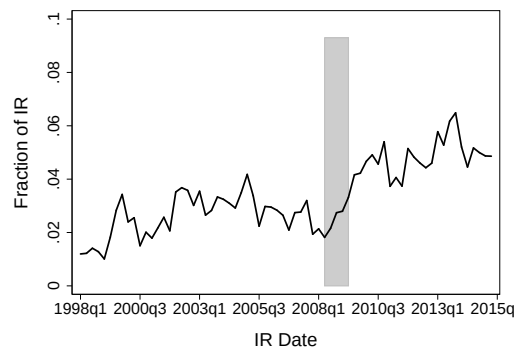
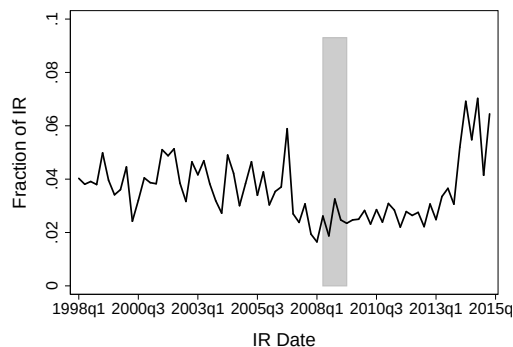


Figure E.1: Topics Ranked by Pro-Cyclicality; Terms within Topics Ranked by Probability

Notes: This table summarizes the 30 separate distributions over vocabulary terms that LDA estimates to represent topics. We order these distributions from 0 to 29 based on a pro-cyclicality index that computes the difference in average time the IR spends discussing the corresponding topic when interest rates are in tightening and loosening cycles, respectively. (There are limited cycles on which to base the cyclicality, but it is only for labelling purposes.) Within each row, terms are ordered left to right by the probability they appear in each topic, with differential shading indicating approximate probability values.



(b) Topic 26 ‘Demand’

Notes: These figures plot the prevalence of two illustrative topics in the Inflation Reports in our sample. Recession periods are shaded in gray. The distributions over terms that each topic induces are represented as word clouds, where the size of term is approximately proportional to its probability.

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Table F.1: Main Variables: Summary Statistics

Variable	Summary Statistics				
	Obs	Mean	Std. Dev.	Min	Max
$\Delta i_{0:12;t}$	70	-0.01	0.06	-0.24	0.11
$\Delta f_{36;t}$	70	-0.01	0.08	-0.31	0.17
$\Delta f_{60;t}$	70	-0.01	0.07	-0.28	0.15
$\Delta f_{60:120;t}$	70	-0.01	0.06	-0.20	0.15
π_m^{CB}	70	-0.13	0.33	-1.50	0.42
$\text{Surp}(\pi_m^{CB})$	70	-0.12	0.31	-1.07	0.58
g_m^{CB}	70	2.71	0.42	1.92	3.97
$\text{Surp}(g_m^{CB})$	70	0.34	0.48	-0.63	1.80
$\tilde{y}_{m;24}^{CB}$	70	0.00	0.01	-0.04	0.01
$\tilde{y}_{m;24}^{CB} - \tilde{y}_{m-1;24}^{CB}$	70	0.00	0.00	-0.02	0.01
$\tilde{y}_{m;21}^{CB} - \tilde{y}_{m-1;24}^{CB}$	70	0.00	0.00	-0.01	0.01
$\text{Var}(\pi_m^{CB})$	70	1.19	0.79	0.28	2.40
$\Delta \text{Var}(\pi_m^{CB})$	69	0.01	0.14	-0.23	0.79
$\text{Skew}(\pi_m^{CB})$	70	0.06	0.16	-0.25	0.40
$\Delta \text{Skew}(\pi_m^{CB})$	69	-0.01	0.16	-0.36	0.40
$\text{Var}(g_m^{CB})$	70	2.00	0.98	0.96	5.32
$\Delta \text{Var}(g_m^{CB})$	69	0.00	0.39	-1.29	1.67
$\text{Skew}(g_m^{CB})$	70	-0.20	0.28	-1.20	0.21
$\Delta \text{Skew}(g_m^{CB})$	69	0.00	0.22	-1.20	0.40

Notes: This table reports the summary statistics for the main variables in the analysis.

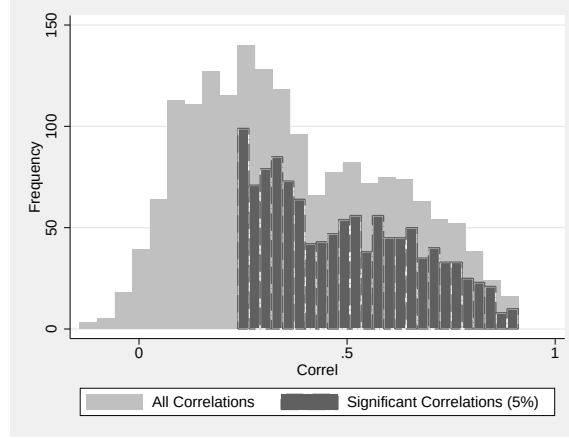


Figure F.1: Correlation between Signed Narrative Topics

Notes: Histogram of the 1770 pairwise correlations between the signed narrative variables. The darker shaded bars indicate correlations that are significantly different from zero at the 5% significance level.

G Cross Validation and Information Tests

G.1 Details of Cross Validation Procedure

Here we detail the cross-validation procedure we use to select λ in our estimation of the elastic net regressions in the paper. Given our small sample size, leave-one-out cross validation is computationally feasible and we adopt it. The specific algorithm is:

1. For each of a sequence of possible λ penalty coefficients:
 - (a) For each of the N data points:
 - i. Remove the point from the sample.
 - ii. Fit (10) on the remaining $N - 1$ points.
 - iii. Calculate the forecasted value for the held-out point from the fitted model, and compute the squared error.
2. Select the highest value of λ that has a mean squared error (MSE) within one standard deviation of the MSE-minimizing λ across N out-of-sample forecasts.

The model selection rule at stage 2 is sparser than the model with the most accurate out-of-sample predictive power because, as λ increases, the elastic net selects fewer co-variates. This increases our confidence that any selected text shock variables have a robust relationship with market interest rates.

Table G.1 reports the value of the penalty weight chosen by LOOCV (λ_{CV}) and the number of text shock variables selected under this model.

It is worthwhile noting that a text shock that is highly correlated with a yield residual in just one IR will, in general, not be selected by this procedure. Instead, we will select

shocks whose correlation with yield residuals is robust across at least several different Reports.

Table G.1: Number of Selected Narrative Shocks from LOOCV

	$ \Delta i_{0:12,t} $	$ \Delta f_{36,t} $	$ \Delta f_{60,t} $	$ \Delta f_{60:120,t} $
λ_{CV}	0.0006	0.001	0.002	0.001
# selected narrative shocks	53	56	56	55

Notes: This table summarizes the estimation of (10) for four market rates by leave-one-out cross validation. At each maturity, a large number of text shock variables are chosen to accurately predict held-out yield residuals.

G.2 Information Tests: Details and Full Results

As described in the text, we test the information in the narrative information using a simple permutation test. This appendix outlines the details.

1. In each of 500 simulations for each interest rate, we:
 - (a) randomly permute the residuals
 - (b) re-estimate (10)
 - (c) record the number of selected narrative shock variables
2. These 500 values make up the distribution of selected topics under randomness and we compare the values in Table G.1 against these simulated distributions.

The results are shown in Figure G.1, where the red-shaded histogram is the distribution of the number of selected narrative shocks generated by the simulations, and the blue dashed line is the number of narrative shocks we select in our actual data. At all interest rate maturities we strongly reject the null hypothesis that the correlations we find are spurious. In the vast majority of permuted draws, the elastic net selects no narrative shocks, and in no draw is the number of selected shocks greater than the number we select with the non-permuted data. We conclude that there indeed appears to be genuine explanatory power contained in the IR narrative that is orthogonal to that in the numerical forecast variables.

We also repeat these tests by component (expectations and term premiums) and we continue to find strong evidence for an important role for narrative information at all maturities for each component.

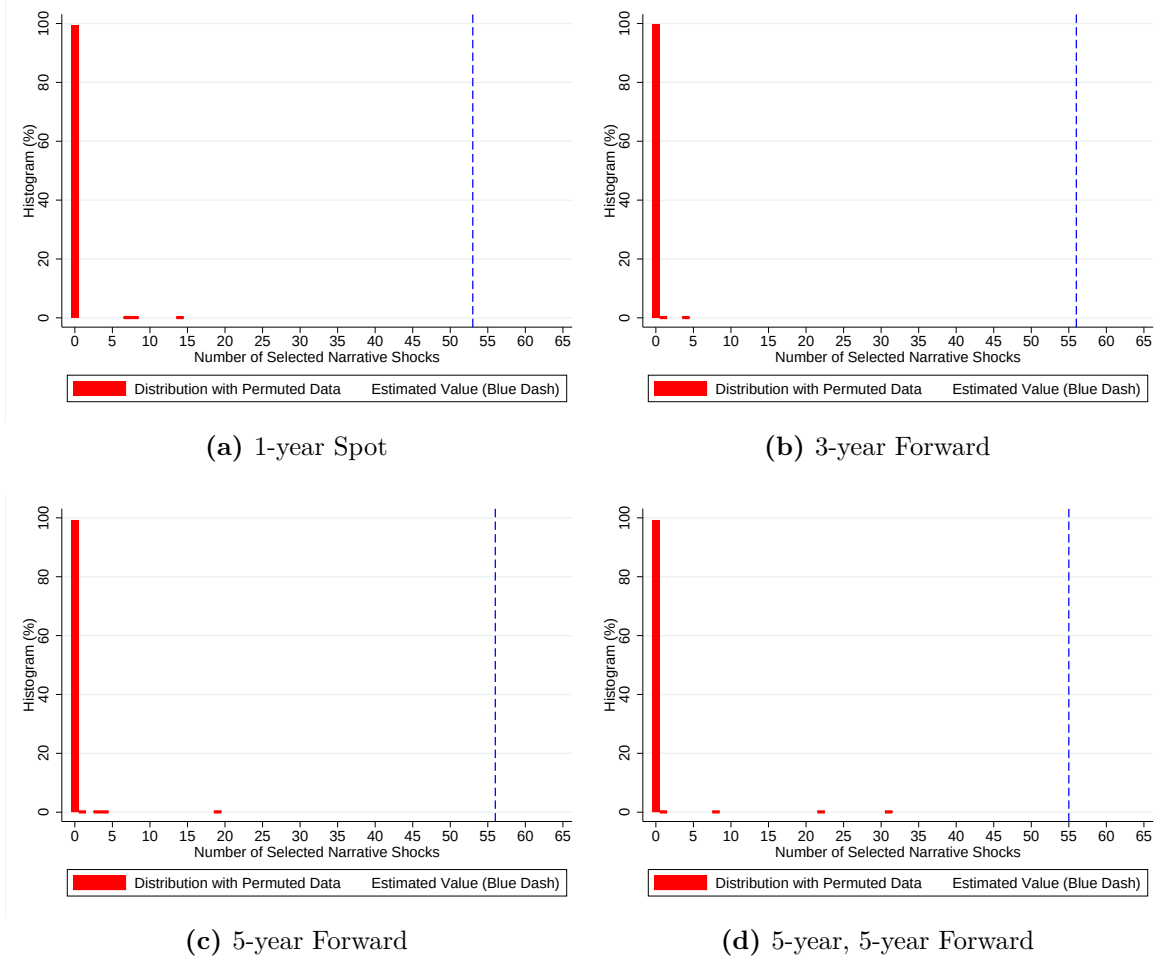


Figure G.1: Permutation Test for Narrative News

Notes: These figures describe a permutation test for narrative news. The blue, dashed vertical lines for each yield plot the number of selected text variables from Table ?? . The red histograms describe the distribution of selected features in 500 different random permutations of yield residuals for which we used the same cross validation procedure as on the original data. In no permutation do we select as many features as with the true order.

H Baseline Analysis: Supplementary Tables

H.1 First Stage Regressions

Table H.1: Effect of Forecast Variables on Market Yields

Main Regressors	(1) $\Delta i_{0:12;t}$	(2) $\Delta i_{0:12;t}$	(3) $\Delta f_{36;t}$	(4) $\Delta f_{36;t}$	(5) $\Delta f_{60;t}$	(6) $\Delta f_{60;t}$	(7) $\Delta f_{60:120;t}$	(8) $\Delta f_{60:120;t}$
π_m^{CB}	0.094** [0.028]	0.080** [0.025]	0.13* [0.056]	0.092 [0.311]	0.11 [0.108]	0.079 [0.363]	0.093 [0.182]	0.066 [0.385]
Surp(π_m^{CB})	0.0040 [0.891]	0.016 [0.590]	-0.012 [0.861]	0.0046 [0.958]	-0.030 [0.658]	-0.014 [0.866]	-0.033 [0.600]	-0.012 [0.874]
g_m^{CB}	-0.049 [0.122]	-0.053 [0.162]	-0.029 [0.402]	-0.062 [0.201]	-0.032 [0.369]	-0.063 [0.127]	-0.034 [0.353]	-0.057 [0.160]
Surp(g_m^{CB})	0.031 [0.413]	0.038 [0.354]	0.018 [0.673]	0.053 [0.382]	0.021 [0.592]	0.054 [0.294]	0.019 [0.628]	0.044 [0.360]
$\tilde{y}_{m;24}^{CB}$	0.36 [0.704]	1.21 [0.483]	0.30 [0.833]	1.25 [0.672]	-0.46 [0.741]	0.33 [0.898]	-0.48 [0.707]	0.059 [0.979]
$\tilde{y}_{m;24}^{CB} - \tilde{y}_{m-1;24}^{CB}$	6.47*** [0.001]	5.53*** [0.050]	3.69 [0.164]	3.53 [0.333]	2.76 [0.347]	1.89 [0.551]	3.42 [0.211]	1.56 [0.547]
$\tilde{y}_{m;21}^{CB} - \tilde{y}_{m-1;24}^{CB}$	-4.66** [0.043]	-4.65** [0.025]	-5.15 [0.149]	-6.89* [0.062]	-3.14 [0.333]	-4.85 [0.128]	-1.79 [0.547]	-2.68 [0.297]
Var(π_m^{CB})		-0.019 [0.115]		-0.016 [0.476]		-0.00077 [0.969]		0.014 [0.410]
Δ Var(π_m^{CB})		-0.028 [0.606]		0.0043 [0.940]		0.070 [0.138]		0.089** [0.044]
Skew(π_m^{CB})		0.099** [0.035]		0.12 [0.161]		0.096 [0.219]		0.097 [0.124]
Δ Skew(π_m^{CB})		-0.061 [0.259]		-0.16** [0.027]		-0.16** [0.011]		-0.13** [0.014]
Var(g_m^{CB})		0.021 [0.161]		-0.0077 [0.794]		-0.023 [0.408]		-0.030 [0.215]
Δ Var(g_m^{CB})		-0.014 [0.337]		-0.041** [0.048]		-0.050*** [0.009]		-0.044** [0.015]
Skew(g_m^{CB})		0.017 [0.697]		-0.037 [0.485]		-0.044 [0.323]		-0.044 [0.297]
Δ Skew(g_m^{CB})		0.031 [0.310]		0.031 [0.486]		0.013 [0.738]		0.0031 [0.928]
Constant	0.11 [0.159]	0.11 [0.280]	0.070 [0.405]	0.17 [0.216]	0.078 [0.380]	0.18 [0.125]	0.085 [0.360]	0.17 [0.151]
R-squared	0.449	0.562	0.262	0.361	0.166	0.333	0.156	0.371
Additional R^2	-	0.113	-	0.099	-	0.167	-	0.215
Partial R^2	-	0.206	-	0.135	-	0.200	-	0.254
Proportion R^2	-	0.202	-	0.275	-	0.501	-	0.579
F-test p-value	-	0.029	-	0.046	-	0.000	-	0.000
Component	Total	Total	Total	Total	Total	Total	Total	Total

Notes: This table reports estimates from regressing changes in market yields on the numeric forecast variables defined in Section 4.1.

Table H.2: Effect of Forecast Variables on Market Yields: Expectations

Main Regressors	(1) $\Delta i_{0;12;t}$	(2) $\Delta i_{0;12;t}$	(3) $\Delta f_{36;t}$	(4) $\Delta f_{36;t}$	(5) $\Delta f_{60;t}$	(6) $\Delta f_{60;t}$	(7) $\Delta f_{60;120;t}$	(8) $\Delta f_{60;120;t}$
π_m^{CB}	0.080** [0.041]	0.067** [0.041]	0.089** [0.027]	0.065 [0.251]	0.086** [0.015]	0.059 [0.250]	0.066** [0.026]	0.046 [0.276]
Surp(π_m^{CB})	0.0062 [0.819]	0.020 [0.475]	0.0040 [0.921]	0.017 [0.743]	-0.0091 [0.807]	0.0045 [0.925]	-0.0055 [0.857]	0.0087 [0.830]
g_m^{CB}	-0.044 [0.109]	-0.051 [0.140]	-0.018 [0.525]	-0.038 [0.326]	-0.014 [0.527]	-0.034 [0.276]	-0.0085 [0.656]	-0.022 [0.428]
Surp(g_m^{CB})	0.028 [0.387]	0.037 [0.306]	0.010 [0.759]	0.032 [0.487]	0.011 [0.690]	0.031 [0.429]	0.0046 [0.846]	0.018 [0.599]
$\tilde{y}_{m;24}^{CB}$	0.28 [0.746]	0.89 [0.547]	0.57 [0.575]	1.17 [0.595]	0.35 [0.683]	0.77 [0.675]	0.58 [0.414]	0.79 [0.612]
$\tilde{y}_{m;24}^{CB} - \tilde{y}_{m-1;24}^{CB}$	5.24*** [0.002]	4.70*** [0.045]	3.21* [0.073]	3.57 [0.188]	2.06 [0.194]	2.39 [0.295]	2.02 [0.102]	2.10 [0.260]
$\tilde{y}_{m;21}^{CB} - \tilde{y}_{m-1;24}^{CB}$	-3.73* [0.058]	-3.69*** [0.044]	-4.21 [0.107]	-5.21** [0.045]	-3.11 [0.159]	-4.27* [0.060]	-2.60 [0.155]	-3.28* [0.079]
Var(π_m^{CB})		-0.014 [0.194]		-0.017 [0.303]		-0.013 [0.375]		-0.0082 [0.480]
Δ Var(π_m^{CB})		-0.031 [0.495]		-0.040 [0.404]		-0.014 [0.731]		-0.024 [0.491]
Skew(π_m^{CB})		0.081* [0.054]		0.085 [0.163]		0.067 [0.210]		0.066 [0.119]
Δ Skew(π_m^{CB})		-0.048 [0.313]		-0.092* [0.075]		-0.092** [0.038]		-0.065* [0.081]
Var(g_m^{CB})		0.016 [0.264]		0.0033 [0.871]		-0.0015 [0.932]		-0.00031 [0.983]
Δ Var(g_m^{CB})		-0.0073 [0.605]		-0.019 [0.249]		-0.025* [0.056]		-0.017 [0.112]
Skew(g_m^{CB})		0.014 [0.721]		-0.017 [0.710]		-0.013 [0.711]		-0.0078 [0.802]
Δ Skew(g_m^{CB})		0.035 [0.200]		0.031 [0.344]		0.017 [0.528]		0.0100 [0.664]
Constant	0.10 [0.132]	0.11 [0.239]	0.043 [0.523]	0.097 [0.364]	0.035 [0.521]	0.092 [0.287]	0.021 [0.642]	0.056 [0.449]
R-squared	0.454	0.568	0.334	0.413	0.304	0.391	0.334	0.409
Additional R^2	-	0.114	-	0.079	-	0.087	-	0.075
Partial R^2	-	0.209	-	0.119	-	0.125	-	0.113
Proportion R^2	-	0.201	-	0.192	-	0.223	-	0.183
F-test p-value	-	0.041	-	0.120	-	0.073	-	0.147
Component	Exp	Exp	Exp	Exp	Exp	Exp	Exp	Exp

Notes: This table reports estimates from regressing changes in the expectations component of market yields on the numeric forecast variables defined in Section 4.1.

Table H.3: Effect of Forecast Variables on Market Yields: Term Premiums

Main Regressors	(1) $\Delta i_{0:12;t}$	(2) $\Delta i_{0:12;t}$	(3) $\Delta f_{36;t}$	(4) $\Delta f_{36;t}$	(5) $\Delta f_{60;t}$	(6) $\Delta f_{60;t}$	(7) $\Delta f_{60:120;t}$	(8) $\Delta f_{60:120;t}$
π_m^{CB}	0.014*	0.013	0.037	0.027	0.028	0.021	0.027	0.020
	[0.085]	[0.147]	[0.294]	[0.519]	[0.543]	[0.654]	[0.633]	[0.686]
Surp(π_m^{CB})	-0.0023	-0.0038	-0.016	-0.012	-0.021	-0.018	-0.028	-0.021
	[0.744]	[0.659]	[0.634]	[0.758]	[0.584]	[0.668]	[0.540]	[0.655]
g_m^{CB}	-0.0044	-0.0027	-0.012	-0.024	-0.018	-0.029	-0.026	-0.035
	[0.474]	[0.729]	[0.455]	[0.228]	[0.502]	[0.316]	[0.479]	[0.400]
Surp(g_m^{CB})	0.0030	0.0011	0.0077	0.021	0.0100	0.024	0.014	0.026
	[0.699]	[0.910]	[0.655]	[0.386]	[0.708]	[0.455]	[0.698]	[0.549]
$\tilde{y}_{m;24}^{CB}$	0.078	0.32	-0.27	0.086	-0.81	-0.44	-1.06	-0.73
	[0.655]	[0.340]	[0.676]	[0.938]	[0.326]	[0.755]	[0.298]	[0.673]
$\tilde{y}_{m;24}^{CB} - \tilde{y}_{m-1;24}^{CB}$	1.23***	0.83	0.49	-0.038	0.70	-0.50	1.40	-0.54
	[0.006]	[0.157]	[0.736]	[0.979]	[0.738]	[0.787]	[0.593]	[0.804]
$\tilde{y}_{m;21}^{CB} - \tilde{y}_{m-1;24}^{CB}$	-0.93**	-0.96*	-0.94	-1.68	-0.037	-0.58	0.81	0.60
	[0.049]	[0.066]	[0.525]	[0.244]	[0.985]	[0.711]	[0.756]	[0.742]
Var(π_m^{CB})		-0.0050**		0.0011		0.012		0.023
		[0.046]		[0.899]		[0.295]		[0.122]
Δ Var(π_m^{CB})		0.0033		0.044*		0.084**		0.11**
		[0.781]		[0.077]		[0.023]		[0.021]
Skew(π_m^{CB})		0.017*		0.038		0.029		0.031
		[0.060]		[0.263]		[0.439]		[0.465]
Δ Skew(π_m^{CB})		-0.013		-0.066**		-0.069**		-0.069*
		[0.211]		[0.027]		[0.041]		[0.076]
Var(g_m^{CB})		0.0059**		-0.011		-0.022		-0.030
		[0.032]		[0.380]		[0.166]		[0.118]
Δ Var(g_m^{CB})		-0.0070***		-0.022**		-0.025**		-0.027*
		[0.002]		[0.014]		[0.048]		[0.095]
Skew(g_m^{CB})		0.0037		-0.020		-0.031		-0.036
		[0.670]		[0.349]		[0.353]		[0.416]
Δ Skew(g_m^{CB})		-0.0043		-0.00051		-0.0039		-0.0069
		[0.533]		[0.979]		[0.873]		[0.815]
Constant	0.0065	0.00095	0.028	0.070	0.043	0.091	0.064	0.11
	[0.656]	[0.962]	[0.476]	[0.219]	[0.518]	[0.273]	[0.488]	[0.349]
R-squared	0.261	0.371	0.060	0.244	0.033	0.275	0.054	0.317
Additional R^2	-	0.110	-	0.184	-	0.242	-	0.263
Partial R^2	-	0.149	-	0.195	-	0.251	-	0.278
Proportion R^2	-	0.297	-	0.754	-	0.880	-	0.830
F-test p-value	-	0.009	-	0.001	-	0.001	-	0.000
Component	TP	TP	TP	TP	TP	TP	TP	TP

Notes: This table reports estimates from regressing changes in the term premium component of market yields on the numeric forecast variables defined in Section 4.1.

H.2 Narrative Regressions

Table H.4: Contribution of Numeric vs. Narrative Variables to R^2

Main Regressors	(1) $\Delta i_{0:12;t}$	(2) $\Delta i_{0:12;t}$	(3) $\Delta f_{36;t}$	(4) $\Delta f_{36;t}$
Signed Topic D1		-0.017** [0.02]		
Signed Topic L11		0.034* [0.05]		0.063** [0.04]
Signed Topic D9		-0.010 [0.15]		-0.034*** [0.01]
Signed Topic L19		-0.024* [0.08]		
Signed Topic D18				0.030** [0.02]
Signed Topic D13				-0.026** [0.03]
Constant	0.11 [0.28]	0.014 [0.89]	0.17 [0.22]	0.12 [0.32]
R-squared	0.562	0.694	0.361	0.561
Topics	Own	Own	Own	Own
Include Vix	No	No	No	No
Include $\mathbf{q}_t$	Yes	Yes	Yes	Yes
Additional R^2	-	0.128	-	0.199
Partial R^2	-	0.29	-	0.31
Proportion R^2	-	0.18	-	0.35
F-test p-value	-	0.025	-	0.023

Notes: Columns (1)-(3) ((4)-(6)) show how much market news for $|\Delta i_{0:12;t}|$ ($|\Delta f_{36;t}|$) can be explained by adding numeric in (2) and then, in (3), numeric and narrative information captured by the top 4 topics. This information is reflected in table 6 in the main text.

Table H.5: Contribution of Numeric vs. Narrative Variables to R^2

Main Regressors	(1) $\Delta f_{60;t}$	(2) $\Delta f_{60;t}$	(3) $\Delta f_{60:120;t}$	(4) $\Delta f_{60:120;t}$
Signed Topic D9		-0.024** [0.05]		
Signed Topic L16		-0.029* [0.06]		-0.030** [0.02]
Signed Topic D18		0.034** [0.01]		0.031*** [0.00]
Signed Topic D13		-0.017* [0.07]		-0.013* [0.08]
Signed Topic L12				-0.0076 [0.47]
Constant	0.18 [0.12]	0.20 [0.16]	0.17 [0.15]	0.20 [0.14]
R-squared	0.333	0.497	0.371	0.515
Topics	Own	Own	Own	Own
Include Vix	No	No	No	No
Include $\mathbf{q}_t$	Yes	Yes	Yes	Yes
Additional R^2	-	0.167	-	0.149
Partial R^2	-	0.25	-	0.24
Proportion R^2	-	0.33	-	0.29
F-test p-value	-	0.014	-	0.017

Notes: Columns (1)-(3) ((4)-(6)) show how much market news for $|\Delta f_{60;t}|$ ($|\Delta f_{60:120;t}|$) can be explained by adding numeric in (2) and then, in (3), numeric and narrative information captured by the top 4 topics. This information is reflected in table 1 in the main text.

Table H.6: Full Matrix of Partial R^2 from Placebo Regressions including Components of the Asset Response

Asset News	Narrative Shocks									
	$i_{0:12;t}$		$f_{36;t}$		$f_{60;t}$		$f_{60:120;t}$			
	Overall	EXP	TP	Overall	EXP	TP	Overall	EXP	TP	TP
$i_{0:12;t}$	0.29***	0.31***	0.11	0.08	0.24***	0.06	0.06	0.08*	0.06	0.04
EXP($i_{0:12;t}$)	0.30***	0.32***	0.08	0.08	0.23***	0.06	0.06	0.10*	0.06	0.04
TP($i_{0:12;t}$)	0.17*	0.10	0.36***	0.13	0.19	0.02	0.06	0.13	0.02	0.04
$f_{36;t}$	0.15	0.11	0.15	0.23*	0.15***	0.15	0.18	0.24***	0.07	0.05
EXP($f_{36;t}$)	0.19***	0.14*	0.14*	0.17	0.25***	0.07	0.08	0.21***	0.05	0.03
TP($f_{36;t}$)	0.11	0.17	0.13	0.17	0.03	0.31**	0.35**	0.15	0.18	0.18
$f_{60;t}$	0.14	0.17	0.12	0.21	0.04	0.26**	0.31**	0.19*	0.14	0.15
EXP($f_{60;t}$)	0.18**	0.12	0.18	0.21*	0.18***	0.11	0.16	0.21***	0.05	0.05
TP($f_{60;t}$)	0.12	0.12	0.08	0.06	0.08	0.38***	0.38***	0.08	0.42***	0.39***
$f_{60:120;t}$	0.12	0.17	0.08	0.13	0.04	0.28**	0.34***	0.13	0.24*	0.23*
EXP($f_{60:120;t}$)	0.22***	0.14*	0.16	0.22**	0.27***	0.10	0.12	0.24***	0.05	0.05
TP($f_{60:120;t}$)	0.14	0.12	0.04	0.07	0.10	0.29**	0.32***	0.08	0.39***	0.36***

Notes: This table replicates table 7 reporting the Partial- R^2 statistics from adding four narrative shocks to explain different yields but expands the analysis to include the breakdown by yield components. The top four topics added are indicated by the column and each row reports the results for a different yield or its component. Stars (***, **, and *) indicate the significance level (1%, 5% and 10%) of an F-test on the joint significance of the narrative shocks given the inclusion of VIX and q_t .

I Robustness

In this section we explore the robustness of the baseline results to a number of potential concerns. These include robustness of the main results to measuring news using the absolute value of asset price changes, excluding the ZLB period, the effect on real rates and measuring the effect of other news on the IR event day.

I.1 News as the absolute value of asset price changes

An alternative measure of asset price news used in the literature on central bank communication takes the absolute value of asset price changes. This is necessary when the analysis is using only dummy variables as the event indicator (since news can be either positive or negative). Using absolute values has the advantage of not needing to assign a tone to the topics. We have, therefore, repeated our analysis using this alternative measure of the news and using the raw topic allocations rather than the signed ones.

The first-stage model replaces the dependent variable in (7) with $|Y_t^k|$, the absolute value of the change in the market interest rates observed on IR publication date t and uses the absolute value of the surprise and difference regressors in $\mathbf{q}_t$. We also include the VIX volatility index as a control, since bond price news may tend to be more volatile on days with increased levels of general market volatility regardless of the level of news in central bank communication; the key results are unaffected by including VIX.

Table I.1: Summary of R^2 Statistics from |Yield| Regressions

		$\mathbf{q}_t^{\text{EXP}}$	Add $\mathbf{q}_t^{\text{UNC}}$	Add Key Narrative Signals
$ \Delta i_{0:12;t} $	R^2	0.4	0.56	0.69
	Additional R^2	-	0.16	0.13***
	Proportion of R^2	-	0.23	0.18
$ \Delta f_{36;t} $	R^2	0.25	0.37	0.51
	Additional R^2	-	0.12	0.14
	Proportion of R^2	-	0.23	0.28
$ \Delta f_{60;t} $	R^2	0.12	0.28	0.5
	Additional R^2	-	0.16**	0.22**
	Proportion of R^2	-	0.31	0.44
$ \Delta f_{60:120;t} $	R^2	0.11	0.27	0.54
	Additional R^2	-	0.16**	0.27***
	Proportion of R^2	-	0.3	0.49

Notes: This table reports the R^2 statistics from regressing absolute values of the changes in market yields on VIX and $\mathbf{q}_t^{\text{EXP}}$ (column 3), VIX, $\mathbf{q}_t^{\text{EXP}}$ and $\mathbf{q}_t^{\text{UNC}}$ (column 4), and VIX, the numeric forecast variables and also the top 4 topic shocks for each yield (column 5).

We repeat the tests of the narrative analysis as in Section 5.2. Table I.1 first reports

the summary regression results. In the subsections below, we document that the information tests show the same importance of narrative information, the correlations between the asset-specific topic rankings (Table I.6) and results of the placebo analysis (Table I.7). The main results are unchanged.

I.1.1 First Stage Regressions: Absolute Values

Table I.2: Effect of Forecast Variables on Market Yields

Main Regressors	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
	$ \Delta i_{0;12;t} $	$ \Delta i_{0;12;t} $	$ \Delta f_{36;t} $	$ \Delta f_{36;t} $	$ \Delta f_{60;t} $	$ \Delta f_{60;t} $	$ \Delta f_{60;120;t} $	$ \Delta f_{60;120;t} $
VIX_t	0.0016*** [0.003]	0.0013** [0.023]	0.0015 [0.302]	0.0023 [0.151]	0.0011 [0.427]	0.0018 [0.229]	0.0012 [0.253]	0.0017 [0.150]
π_m^{CB}	-0.037 [0.207]	-0.016 [0.535]	-0.060** [0.025]	-0.014 [0.698]	-0.014 [0.612]	0.016 [0.645]	-0.0014 [0.963]	0.025 [0.432]
$ \text{Supr}(\pi_m^{CB}) $	0.0018 [0.957]	0.034 [0.292]	-0.018 [0.618]	-0.035 [0.442]	-0.0026 [0.942]	-0.042 [0.314]	-0.022 [0.538]	-0.051 [0.152]
g_m^{CB}	0.018 [0.127]	0.031** [0.038]	-0.0032 [0.848]	0.00010 [0.995]	-0.015 [0.388]	-0.012 [0.476]	-0.024 [0.165]	-0.015 [0.381]
$ \text{Supr}(g_m^{CB}) $	-0.0097 [0.704]	-0.048* [0.063]	0.042* [0.099]	0.050 [0.140]	0.042 [0.114]	0.053* [0.084]	0.037 [0.196]	0.024 [0.373]
$\tilde{y}_{m;24}^{CB}$	1.00 [0.310]	0.41 [0.722]	1.92* [0.087]	3.35* [0.097]	0.76 [0.541]	1.68 [0.369]	0.067 [0.961]	-0.50 [0.747]
$ \tilde{y}_{m;24}^{CB} - \tilde{y}_{m-1;24}^{CB} $	4.01 [0.130]	4.96** [0.015]	-0.28 [0.945]	1.41 [0.685]	-2.36 [0.564]	-1.00 [0.767]	-2.05 [0.523]	-1.43 [0.595]
$ \tilde{y}_{m;21}^{CB} - \tilde{y}_{m-1;24}^{CB} $	0.25 [0.899]	1.64 [0.430]	1.47 [0.647]	-0.35 [0.925]	2.28 [0.503]	-0.25 [0.944]	1.88 [0.548]	1.31 [0.652]
$\text{Var}(\pi_m^{CB})$		-0.011 [0.324]		0.025 [0.161]		0.021 [0.257]		0.020 [0.218]
$\Delta \text{Var}(\pi_m^{CB})$		0.038 [0.455]		-0.057 [0.240]		-0.12** [0.011]		-0.085* [0.084]
$\text{Skew}(\pi_m^{CB})$		0.0045 [0.891]		0.0100 [0.834]		-0.0040 [0.924]		-0.0036 [0.923]
$\Delta \text{Skew}(\pi_m^{CB})$		0.025 [0.500]		0.065 [0.150]		0.068 [0.108]		0.052 [0.154]
$\text{Var}(g_m^{CB})$		0.0010 [0.934]		-0.0052 [0.765]		-0.0021 [0.903]		-0.012 [0.446]
$\Delta \text{Var}(g_m^{CB})$		0.0098 [0.539]		0.019 [0.236]		0.024 [0.153]		0.034* [0.058]
$\text{Skew}(g_m^{CB})$		-0.014 [0.688]		-0.071 [0.171]		-0.060 [0.202]		-0.045 [0.260]
$\Delta \text{Skew}(g_m^{CB})$		-0.063** [0.049]		-0.00055 [0.990]		0.0031 [0.938]		-0.022 [0.533]
Constant	-0.053* [0.089]	-0.070* [0.075]	0.019 [0.716]	-0.026 [0.693]	0.052 [0.341]	0.014 [0.833]	0.074 [0.138]	0.043 [0.456]
R-squared	0.403	0.563	0.250	0.368	0.122	0.280	0.114	0.274
Partial R-squared	-	0.269	-	0.157	-	0.180	-	0.181
Proportion R-squared	-	0.285	-	0.320	-	0.564	-	0.584
F-test p-value	-	0.182	-	0.260	-	0.011	-	0.015
R-squared No Vix	0.336	0.336	0.216	0.216	0.099	0.099	0.082	0.082
Component	Total	Total	Total	Total	Total	Total	Total	Total

Notes: This table reports estimates from regressing absolute changes in market yields on the numeric forecast variables defined in Section 4.1.

I.1.2 Information Tests: Absolute Values

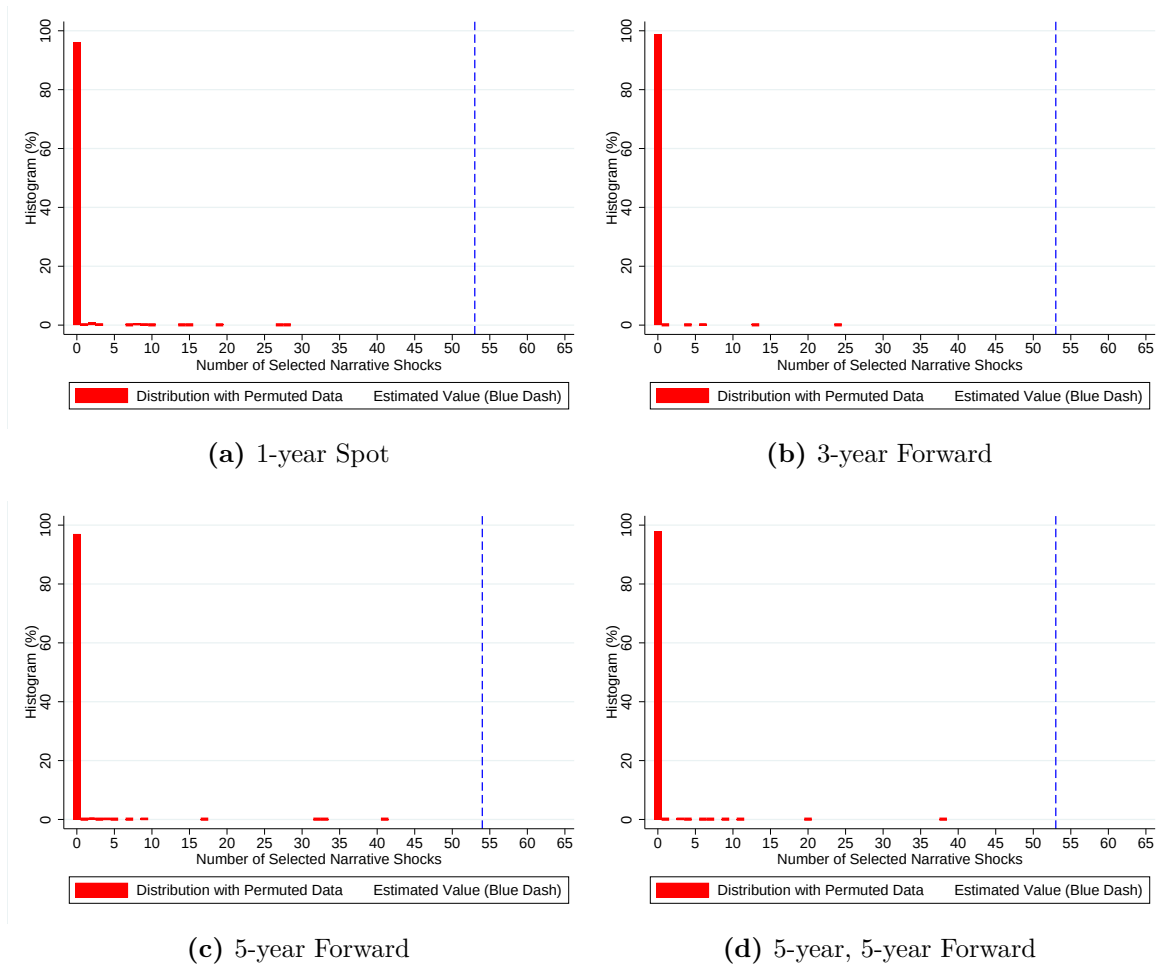


Figure I.1: Permutation Test for Narrative News

Notes: These figures describe a permutation test for narrative news. The blue, dashed vertical lines for each yield plot the number of selected text variables as in Table ?? in the main text. The red histograms describe the distribution of selected features in 500 different random permutations of yield residuals for which we used the same cross validation procedure as on the original data. In no permutation do we select as many features as with the true order.

I.1.3 Top Topics: Absolute Values

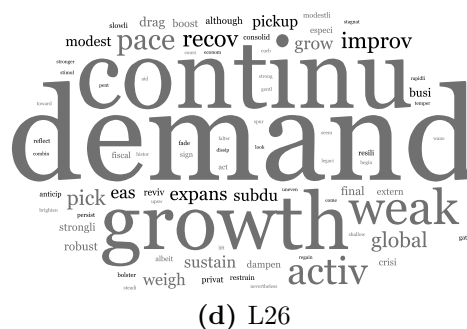
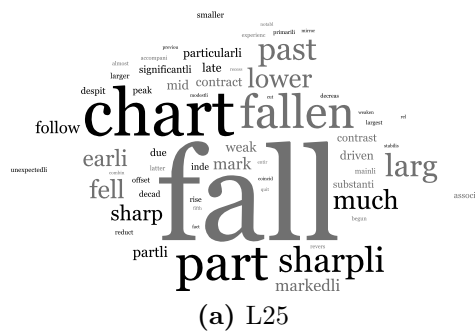


Figure I.2: Key Topics for Market Reaction to Narrative: 1-Year Spot Rate

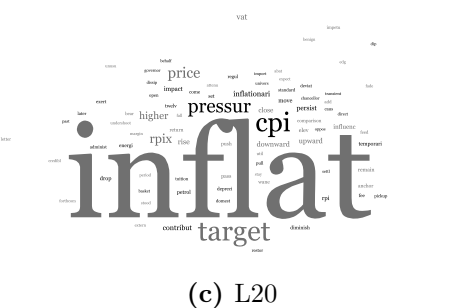
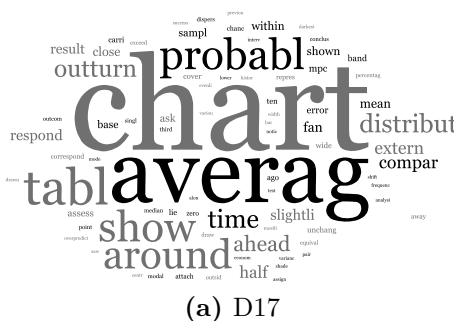


Figure I.3: Key Topics for Market Reaction to Narrative: 5-Year, 5-Year Forward Rate

Table I.3: Top Topics for Different Yields (L=Level; D=Change)

Var	$ \Delta i_{0:12,t} $ Selection %	Var	$ \Delta f_{36,t} $ Selection %	Var	$ \Delta f_{60,t} $ Selection %	Var	$ \Delta f_{60:120,t} $ Selection %
L25	0.958	D24	0.858	L28	0.876	D17	0.91
D24	0.954	D25	0.844	D17	0.784	D18	0.896
L5	0.932	L28	0.826	D18	0.772	L20	0.836
L26	0.91	D14	0.76	L20	0.722	D13	0.808

Notes: This table lists the top four topics for each yield according to fraction of times they are selected across 500 bootstrap draws. An L indicates the topic variable corresponds to a residual in levels, while a D indicates a residuals in the absolute change in the topic level.

I.1.4 Narrative Regressions: Absolute Values

Table I.4: Effect of Top Expectations and Term Premium Narrative Shocks on R^2

Main Regressors	(1) $ \Delta i_{0:12;t} $	(2) $ \Delta i_{0:12;t} $	(3) $ \Delta f_{36;t} $	(4) $ \Delta f_{36;t} $
VIX _t		0.00050 [0.34]		0.0037** [0.02]
Topic L25		1.80*** [0.01]		
Topic D24		-0.66 [0.13]		-1.42 [0.11]
Topic L5		-1.32** [0.02]		
Topic L26		-1.34** [0.03]		
Topic D25				-2.91 [0.14]
Topic L28				1.35* [0.05]
Topic D14				2.00 [0.28]
Constant	-0.070* [0.08]	0.014 [0.81]	-0.026 [0.69]	-0.058 [0.35]
R-squared	0.563	0.693	0.368	0.510
Topics	Own	Own	Own	Own
Include Vix	Yes	Yes	Yes	Yes
Include $\mathbf{q}_t$	Yes	Yes	Yes	Yes
Additional R^2	-	0.127	-	0.142
Partial R^2	0.39	0.29	0.26	0.23
Proportion R^2	-	0.18	-	0.28
F-test p-value	-	0.001	-	0.120

Notes: Columns (1)-(3) [(4)-(6)] show how much market news for $|\Delta i_{0:12;t}|$ ($|\Delta f_{36;t}|$) can be explained by the overall yield top narrative shocks in (1) [(4)], the top narrative shocks for the yield expectations component in (2) [(5)], and the top narrative shocks for the term premium component in (3) [(6)].

Table I.5: Effect of Top Expectations and Term Premium Narrative Shocks on R^2

	(1)	(2)	(3)	(4)
Main Regressors	$ \Delta f_{60;t} $	$ \Delta f_{60;t} $	$ \Delta f_{60:120;t} $	$ \Delta f_{60:120;t} $
VIX _t		0.0035*** [0.01]		0.0030*** [0.00]
Topic L28		1.48** [0.02]		
Topic D17		1.41* [0.08]		1.77** [0.01]
Topic D18		-2.39 [0.23]		-3.34* [0.06]
Topic L20		1.39* [0.08]		2.07*** [0.00]
Topic D13				-3.26*** [0.01]
Constant	0.014 [0.83]	-0.053 [0.44]	0.043 [0.46]	-0.0070 [0.89]
R-squared	0.280	0.502	0.274	0.542
Topics	Own	Own	Own	Own
Include Vix	Yes	Yes	Yes	Yes
Include $\mathbf{q}_t$	Yes	Yes	Yes	Yes
Additional R^2	-	0.220	-	0.266
Partial R^2	0.23	0.31	0.23	0.37
Proportion R^2	-	0.44	-	0.49
F-test p-value	-	0.023	-	0.004

Notes: Columns (1)-(3) ((4)-(6)) show how much market news for $|\Delta f_{60;t}|$ ($|\Delta f_{60:120;t}|$) can be explained by the overall yield top narrative shocks in (1) [(4)], the top narrative shocks for the yield expectations component in (2) [(5)], and the top narrative shocks for the term premium component in (3) [(6)].

Table I.6: Pearson Correlations of Narrative Signals' Selection Percentage Across |Yield|

	$ \Delta i_{0:12,t} $	$ \Delta f_{36,t} $	$ \Delta f_{60,t} $	$ \Delta f_{60:120,t} $
$ \Delta i_{0:12,t} $	1.00			
$ \Delta f_{36,t} $	0.19	1.00		
$ \Delta f_{60,t} $	0.05	0.68***	1.00	
$ \Delta f_{60:120,t} $	0.11	0.47***	0.82***	1.00

Notes: This table reports the Pearson correlation coefficient of the topics' selection percentages across 500 bootstrap draws for different yields. */**/** denote significance at the 10/5/1% significance level.

Table I.7: Matrix of Additional R^2 from Placebo Regressions

Asset News	Narrative Shocks			
	$ \Delta i_{0:12;t} $	$ \Delta f_{36;t} $	$ \Delta f_{60;t} $	$ \Delta f_{60:120;t} $
$ \Delta i_{0:12;t} $	0.29***	0.08	0.06	0.01
$ \Delta f_{36;t} $	0.15	0.24***	0.18	0.11
$ \Delta f_{60;t} $	0.14	0.21	0.31**	0.24*
$ \Delta f_{60:120;t} $	0.12	0.13	0.34***	0.37***

Notes: This table reports the Additional R^2 statistic from a regression of the absolute value of changes in market yields on VIX and the numeric forecast variables ($\mathbf{q}_t$) to which four narrative shocks are added. Each row reports the results for a different yield. Each column indicates the yields from which the top narrative shocks are estimated. For example, the cell in the bottom right indicates the additional R^2 from adding the top four narrative shocks estimated from the 5y-5y forward rates on 5y-5y forward rate news; it is the same result as in table 6. Stars (***, **, and *) indicate the significance level (1%, 5% and 10%) of an F-test on the joint significance of the narrative shocks given the inclusion of $\mathbf{q}_t$.

I.2 The effect of the Zero Lower Bound

Our model does not consider the impact of the Zero Lower Bound (ZLB). One concern is that in a situation where the ZLB is binding, the short-end of the yield is downwardly constrained. This means a signal that economic conditions will be persistently weaker, which would be expected to shift the short- and long-end of the yield curve equally, can only move the yield curve further out. This would be an expectations shock that appeared to only move the long-end. Moreover, to the extent that the persistent weakness of the economy might signal that the economy may have switched into a new regime in which deflation risk is higher, those effects may come through a change in term premiums.

To assess the role that this plays in driving our results, we analyze the effect of removing the ZLB period from our analysis. In our sample, the ZLB was binding from March 2009 and so the pre-ZLB sample is reduced by 25 IR events.

In spite of the small sample, the key results from the whole sample are present in this period. First, the basic pattern of the effect of the numeric forecast information holds; expectational signals have the greater effect at the short end while distributional information is relatively more important further out. In fact, the numeric information explains more of the market reaction at all points on the yield curve to the IR before the ZLB.

Notwithstanding there being a smaller residual left to explain, the narrative continues to continue important information that helps to explain this residual reaction.

Table I.8 shows the correlation across the full sample and the pre-ZLB sample of the top topics measured using the topic variables' selection percentage from the bootstrap draws. This table reassures us that it is unlikely to be the ZLB period that drives our results given that the top topics are similar in the pre-ZLB period. Even more reassuringly, the information that explains the residual asset price news at the short-end of the yield curve is different to the signals that explain the residual movements at the longer maturities. This is shown in Table I.9.

Table I.8: Topic inclusion probabilities: Correlation across Pre-ZLB and Full Sample

Asset	$\Delta i_{0:12,t}$	$\Delta f_{36,t}$	$\Delta f_{60,t}$	$\Delta f_{60:120,t}$
Correlation	0.66***	0.26**	0.53***	0.52***

Notes: This table shows the correlation across the full sample and the pre-ZLB sample of the topic rankings measured using the topic variables' selection percentage from the bootstrap draws.

Table I.9: Pre-ZLB Pearson Correlations of Narrative Signals' Selection Probabilities

	$\Delta i_{0:12,t}$	$\Delta f_{36,t}$	$\Delta f_{60,t}$	$\Delta f_{60:120,t}$
$\Delta i_{0:12,t}$	1.00			
$\Delta f_{36,t}$	0.15	1.00		
$\Delta f_{60,t}$	-0.01	0.66***	1.00	
$\Delta f_{60:120,t}$	-0.07	0.33***	0.80***	1.00

Notes: This table reports the Pearson correlation coefficient of the topics' selection percentages across 500 bootstrap draws for different yields and for different components of the yield curve. *** denotes significance at the 1% significance level.

I.3 Analysis of real interest rates

We have thus far focused on nominal rates due to lack of data availability for real rates – in particular, real rates data is not available over much of our sample for the 1-year spot interest rate. But it is real rates that should have the biggest impact on real economic decisions such as investment. Therefore, despite the data limitation, we can reassure that the basic analysis also affects the real yields too.

Figure I.4 plots the news in equivalent real and nominal yields on IR publication dates in our sample for the three real rates. The most striking observation, consistent with the findings in Nakamura and Steinsson (2018), is that real and nominal yields move closely together. The correlation between the real and nominal market reactions are 0.81, 0.85 and 0.8 for the 3y, 5y and 5y5y-forward rate respectively. All are significant at the 1% significance level. The implication is that inflation expectations, at least at longer maturities, do not react too much in response to the IR.

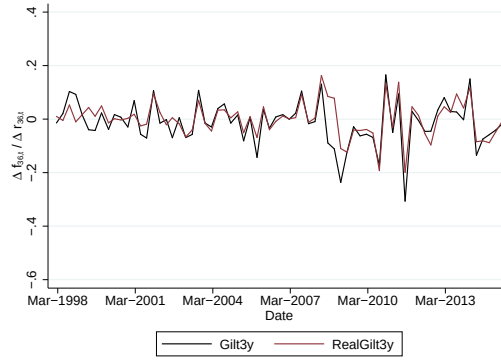
The information test shows that the narrative shocks have explanatory power for the real market news residual (not reported). And the key narrative signals which drive the nominal yield curve are significantly correlated with the key narrative signals driving the real market reaction, as shown in Table I.10.

Table I.10: Topic inclusion probabilities: Correlation for Real and Nominal Yields

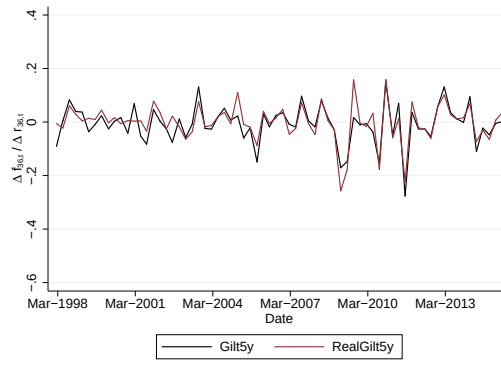
Asset	$\Delta f_{36,t}$	$\Delta f_{60,t}$	$\Delta f_{60:120,t}$
Correlation	0.63***	0.61***	0.51***

Notes: This table shows the correlation across the real and nominal topic rankings measured using the topic variables' selection percentage from the bootstrap draws.

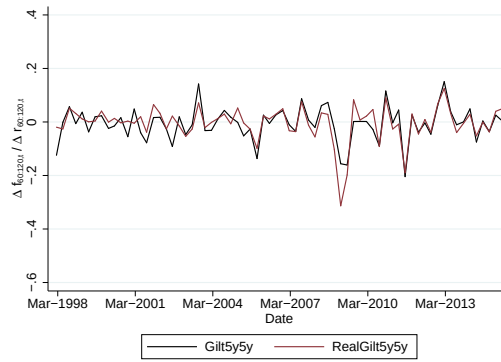
Finally, although we cannot test the difference of the signals driving the short end and the long end, the 3-year forward, 5-year forward and 5-year, 5-year forward rates correlation structure looks similar to that in the nominals, as shown in Table I.11



(a) 3-year Forward



(b) 5-year Forward



(c) 5-year, 5-year Forward

Figure I.4: Market News in Real and Nominal Yields on IR Days

Table I.11: Real Yields: Pearson Correlations of Narrative Signals' Selection Probability

	$ \Delta r_{36,t} $	$ \Delta r_{60,t} $	$ \Delta r_{60:120,t} $
$ \Delta r_{36,t} $	1	.	.
$ \Delta r_{60,t} $	0.34***	1	.
$ \Delta r_{60:120,t} $	-0.01	0.71***	1

Notes: This table reports the Pearson correlation coefficient of the topics' selection percentages across 500 bootstrap draws for different yields and for different components of the yield curve. *** denotes significance at the 1% significance level.

I.4 Interaction effects and labour market releases

One concern may be that the effect of the IR depends on the news from the monetary policy decision a week earlier. Examining specific interactions between topics and earlier news, while potentially interesting, is impossible given our limited data set. However, we show in Table I.12 that allowing for a linear effect of the earlier monetary policy shock, in addition to the numerical $\mathbf{q}_t$ IR data, has no effect.

Another concern mentioned above is that some of the IR publication days coincide with labour market data releases. The IR does not include these data as it includes data only up to close of business on the Wednesday before the monetary policy decision a week earlier. This additional, uncorrelated, news should make it harder to identify an IR effect. Nonetheless, since we have measures of the surprise in the labour market release for unemployment, jobless claims and average earnings, albeit only from 2003 onward, we also show that including these data does not change the analysis (Table I.12).

The residual variation left to explain from these regressions is essentially unchanged from the first stage regression without their inclusion; the correlations are between 0.95 and 0.99. This suggests that although some movements in the longer-maturity yields are reacting to the labour release, this is in addition to the variation driven by the IR.

Table I.12: The effect of other data on IR news

Main Regressors	(1) $\Delta i_{0:12;t}$	(2) $\Delta f_{36;t}$	(3) $\Delta f_{60;t}$	(4) $\Delta f_{60:120;t}$
Announcement Surprise	-0.026 [0.840]	-0.039 [0.815]	0.013 [0.931]	0.039 [0.771]
Surp(Claims)	0.0027 [0.809]	0.043** [0.035]	0.048*** [0.009]	0.038** [0.014]
Surp(UE)	0.0087 [0.509]	0.0084 [0.555]	-0.0016 [0.890]	-0.0067 [0.528]
Surp(Earnings)	0.0035 [0.562]	0.0047 [0.627]	0.0046 [0.564]	4.6e-06 [0.999]
IR Forward Guidance	0.035** [0.022]	0.12** [0.027]	0.064 [0.175]	0.0094 [0.821]
R-squared	0.577	0.462	0.423	0.431
Includes $\mathbf{q}_t$	Yes	Yes	Yes	Yes
Base R^2	0.562	0.361	0.333	0.371
Partial R^2	0.035	0.158	0.135	0.095
Additional R^2	0.015	0.101	0.090	0.060
Proportion R^2	0.026	0.218	0.213	0.139
F-test p-value	0.302	0.092	0.079	0.219
Component	Total	Total	Total	Total

Notes: This table shows the coefficients on the additional potential drivers of IR release day news when included in (7) in addition to the numerical $\mathbf{q}_t$ IR data.

References

- Andreasen, M. and Meldrum, A. (2015). Market beliefs about the UK monetary policy lift-off horizon: a no-arbitrage shadow rate term structure model approach. *Bank of England working papers*, 541.
- Apel, M. and Blix Grimaldi, M. (2012). The Information Content of Central Bank Minutes. Working Paper Series 261, Sveriges Riksbank (Central Bank of Sweden).
- Boukous, E. and Rosenberg, J. (2006). The information content of FOMC minutes. Technical report, Federal Reserve Bank of New York.
- Chang, J., Gerrish, S., Boyd-Graber, J. L., and Blei, D. M. (2009). Reading tea leaves: How humans interpret topic models. In *Advances in Neural Information Processing Systems*.
- Griffiths, T. L. and Steyvers, M. (2004). Finding scientific topics. *Proceedings of the National Academy of Sciences*, 101(Suppl. 1):5228–5235.
- Hansen, S. and McMahon, M. (2016). *Journal of International Economics*, 99:S114 – S133. 38th Annual NBER International Seminar on Macroeconomics.

- Hansen, S., McMahon, M., and Prat, A. (2018). Transparency and deliberation within the FOMC: A computational linguistics approach. *The Quarterly Journal of Economics*, 133(2):801–870.
- Hendry, S. and Madeley, A. (2010). Text Mining and the Information Content of Bank of Canada Communications. Working Papers 10-31, Bank of Canada.
- Malik, S. and Meldrum, A. (2016). Evaluating the robustness of UK term structure decompositions using linear regression methods. *Journal of Banking and Finance*, 67:85–102.
- Nakamura, E. and Steinsson, J. (2018). High-frequency identification of monetary non-neutrality: The information effect. *The Quarterly Journal of Economics*, 133(3):1283–1330.
- Reeves, R. and Sawicki, M. (2007). Do Financial Markets React to Bank of England Communication? *European Journal of Political Economy*, 23(1):207–227.
- Thorsrud, L. A. (2018). Words are new numbers: A Newsy Coincident Index of the Business Cycle. *Journal of Business & Economic Statistics*, forthcoming.
- Vlieghe, G. (2016). Monetary policy expectations and long term interest rates. Speech given by Gertjan Vlieghe, External MPC member, Bank of England at London Business School on 19 May 2016.