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Forward Guidance and Expectation Formation: A Narrative Approach[1]

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Motivation

- Eggertsson and Woodford (2003) showed that forward guidance
  (FG) can help avoid a major recession once the economy has hit
  the **zero lower bound** by **committing** to maintain the policy rate
  at stimulative levels, which **lowers expectations** about future
  interest rates (both short-term and long-term).

Research Questions

- **How valid are these assumptions made in the theoretical literature?**

    - How much does FG influence *revisions to the level* of forecasters' rate expectations?
    - Is FG with *commitment* a realistic assumption?
    - If so, does commitment *amplify* the influence of FG?
    - Is FG at the *effective lower bound* powerful?
    - When is forward guidance most effective? Least effective?

Contributions

- **A *multi-country* study of *how* forward guidance (FG) affects *revisions* to interest rate expectations.**

- Why is that important?
  - Many studies focus on a few usual examples from the U.S.
  - But, far more episodes of FG than typically understood.
  - Most studies also focus on the financial crisis period.
  - But FG started much earlier and persists to this day.
  - This paper: estimates of the effects of FG *more generally* (vs isolated cases).
  - *Special cases of FG tell us about how FG works*.

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A Narrative Approach

- This paper makes a methodological contribution by providing evidence that a narrative approach (Shiller (2017)) to the measurement of forward guidance and central bank information effects using survey data represents a robust complement to other approaches:

  - Market data (Gürkaynak et al. (2005), Altavilla et al. (2019)).
  - Computational linguistics (Hansen and McMahon (2016)).
  - Experiments (Kryvtsov and Petersen (2020)).

A Narrative Approach

- FG is *a central bank (CB) statement that provides direct information about the probable state of monetary policy in the future*.

- I analyzed 30 years of monetary policy statements across eight central banks and, *inter alia*, identified all *changes* in FG.

- $\Delta \tilde{f}_{ct} \in \{-1, 0, 1\}$

- I propose very particular definitions of Odyssean, Delphic, time-contingent, state-contingent, and qualitative FG, and record whether all instances of FG possess any such attributes.

A Narrative Approach

- The advantage of this approach is that it focuses on identifying FG based on the *intention* of the monetary policy committee as judged by the choice of language in press releases.

- By contrast, the literature focuses on *perception*. It identifies FG by making inferences about surprise market interest rate movements immediately following policy announcements.

- By taking a more subjective approach, I can follow a CB's FG narrative and demarcate *all* shifts in that narrative (Shiller (2017))—not just surprise shifts. Avoids selection bias.

- Content must be read very carefully for *meaning* and, even more subtly, *shifts in that meaning*—a task much better suited to the human brain.

Why hasn't this been done before?

- The identification challenge
    - **How to disentangle its effects from those of other macroeconomic trends and policy interventions?**

- The data challenge
    - Requires a large FG data set spanning multiple years and countries.
        - Difficult to do with market data due to heterogeneous market conventions and data availability. Use survey data.
        - New data set that uses a narrative approach to record and categorize the FG of eight inflation-targeting central banks.
        - Tracks individual forecasters over time within countries.

## Econometric Model of Expectation Formation and FG

$$\Delta r_{ict}^h = \beta \Delta \tilde{f}_{ct} + \gamma \Delta \tilde{q}_{ct} + \phi \Delta \tilde{p}_{ct} + \varphi \tilde{e}_{ct} + \delta_1 \Delta \pi_{ict}^h + \delta_2 \Delta g_{ict}^h + \delta_3 \Delta u_{ict}^h + \alpha_i + \alpha_t + \varepsilon_{ict}$$
$$(1)$$

- Δr_{ict}^h : *revision* to individual private forecast of the 3-month T-bill rate in $h = 12$ months.

- $\Delta \tilde{f}_{ct}$: *change* in forward guidance, strictly precedes Δr_{ict}^h.
  - $\Delta \tilde{f}_{ct} \in \{-1, 0, 1\}, \Delta \tilde{q}_{ct} \in \{-1, 0, 1\}, \Delta \tilde{p}_{ct} \in \mathbb{Z}(bps), \tilde{e}_{ct} \in \{0, 1\}$

- $\Delta \pi_{ict}^h$: matching *revision* to forecast of inflation over next 12 months.
  - $g =$growth, $u =$unemployment.

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Data Overview

- Twelve countries.

- Monthly data from January 1990 to May 2020.

- Individual forecasters tracked across time through mergers and acquisitions.

- $T \approx 360$, $N \approx 400$ (unbalanced panel).

- Data restricted to inflation-targeting periods only.

- Better to show an example of the data...

Changes to forward guidance (Canada)
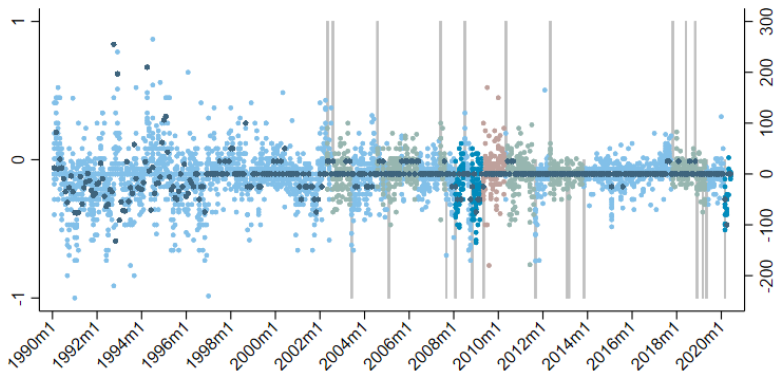
Forward guidance change {-1,0,1} (LHS)

Policy rate forecast (12-month horizon), no forward guidance (bps, RHS)

Policy rate forecast (12-month horizon), dovish Delphic forward guidance (bps, RHS)

Policy rate forecast (12-month horizon), hawkish Delphic forward guidance (bps, RHS)

Policy rate forecast (12-month horizon), dovish Odyssean forward guidance (bps, RHS)

Central bank policy rate (bps, RHS)

Monthly Data, January 1990 to May 2020

Estimation

- Twelve-country panel.

- Forecaster fixed effects.

- Monthly fixed effects.

- Robust standard errors clustered at country level.

Baseline estimates, Odyssean FG, and FG at the ELB

	[1]	[2]	[3]
(1) Forward guidance $\{-1,0,1\}$ change $(+1)$	5.23***	8.88***	9.16***
	(1.20)	(1.71)	(1.85)
(2) Policy rate (PR) change $(+25\text{ bps})$	6.98***	6.75***	6.81***
	(0.77)	(0.74)	(0.74)
(3) Private inflation forecast revision $(+25\text{ bps})$	3.63***	3.65***	3.61***
	(0.41)	(0.42)	(0.40)
(4) Private GDP growth forecast revision $(+25\text{ bps})$	3.94***	4.17***	3.90***
	(0.20)	(0.22)	(0.18)
(5) Quantitative easing $\{-1,0,1\}$ change $(+1)$	-2.95**	-0.91	-0.80
	(1.30)	(0.91)	(0.97)
(6) Effective lower bound $\{0,1\}$	0.58**	-0.38	-0.16
	(0.26)	(0.29)	(0.29)
(1) x $|(2)|$		-3.94***	-3.24***
		(0.84)	(0.72)
(1) x $|(5)|$		3.65**	1.56
		(1.58)	(2.26)
(1) x (6)		-9.22***	-8.82***
		(1.45)	(1.65)
(1) x Odyssean forward guidance $\{0,1\}$		14.66***	4.26
		(2.84)	(7.28)
Adjusted R^2	0.20	0.20	0.21
N	47596	47126	47596

Dependent variable: revisions to individuals' forecasts of the 3-month T-bill rate in 12 months' time.
Columns [1] and [3] use all sample data (1990 to 2020). Column [2] omits the data from 2020.
Clustered standard errors (at the country level) are shown in parentheses.
* $p < 0.10$, ** $p < 0.05$, *** $p < 0.01$

Information Effects

- *Information Effects*: news provided by a central bank about the underlying state of the economy.

- Existing studies capture information effects indirectly by inferring them from the comovement of asset prices (Nakamura and Steinsson (2018), Cieslak and Schrimpf (2019), Jarocinski and Karadi (2020), and Andrade and Ferroni (2020)).

- I control for information effects directly by using the central bank projections publicly released alongside monetary policy announcements.

Rate Expectations and CB Information Effects

	[1]	[2]	[3]	[4]	[5]	[6]
CB π revision (+25 bps)	0.78**	0.15	0.41	-0.21	0.30	0.47**
	(0.27)	(0.16)	(0.53)	(0.23)	(0.25)	(0.19)
CB GDP g rev. (+25 bps)	0.39*	-0.11	-0.53*	0.04	0.15	-0.09
	(0.18)	(0.12)	(0.23)	(0.22)	(0.29)	(0.19)
Indiv. π rev. (+25 bps)		2.31***	3.98***	1.69***	1.53***	2.07***
		(0.40)	(0.73)	(0.38)	(0.34)	(0.48)
Indiv. GDP g rev. (+25 bps)		4.50***	6.88***	4.40***	1.71**	4.24***
		(0.52)	(0.96)	(0.52)	(0.57)	(0.58)
FG $\{-1, 0, 1\}$ change		5.72***	6.95***	6.27**	2.97**	
		(1.03)	(1.07)	(1.95)	(1.17)	
Adjusted R^2	0.00	0.22	0.20	0.27	0.17	0.14
N	26304	26304	8796	9627	7881	18776

Dependent variables [1]-[6]: revisions to individuals' forecasts, 3-month T-bill rate in 12 months (bps).
Columns [1]-[2]: full sample; column [3]: 1990-2006; column [4]: 2007-2014; column [5]: 2015-2020.
Column [6]: subsample, periods with no policy rate change, no FG change, and no QE change.
Regressions [2]-[6] include all controls from Eqn 1. Standard errors clustered at the country level.

Rate Expectations and CB Information Effects

- **Conclusion**: when forming rate expectations, forecasters are strongly influenced by monetary policy signals such as FG; they place near full weight on their own inflation and growth expectations and, ordinarily, near zero weight on those of the CB.

- Hansen and McMahon (2016) show that FOMC forward guidance shocks influence markets more than FOMC verbal communication about the state of the economy...

Rate Expectations and CB Information Effects

- "*Perhaps this is because the markets react more to other, more quantitative, information released by the FOMC or that they update their views of the economy in a similar way to the FOMC in response to economic releases such that **there is little news in the FOMC view about the economy, but only news in how the FOMC intends to react to it**" (Hansen and McMahon (2016), p. S130) [emphasis added].

Conclusions

- Average revision to short-term interest rate forecasts in response to FG is about **five basis points** in the intended direction.

  - FG influence much weaker at the ELB.
  - Commitment (Odyssean FG) likely *amplifies* the influence of FG.
  - FG effects not attributable to CB information effects.
  - Forecasters place full weight on their own inflation/growth forecasts and zero weight on those of the CB.
  - Influence of unexpected FG roughly double that of normal FG.
  - Forecaster disagreement an important channel for FG transmission.

Estimation II

- **Pooled regressions**:
    - Twelve-country panel.
    - Forecaster fixed effects.
    - Monthly fixed effects.
    - Robust standard errors clustered at country level.

- **Country-by-country panel regressions**:
    - Firm and yearly fixed effects.
    - Robust standard errors clustered at firm level.

Country-by-country estimates
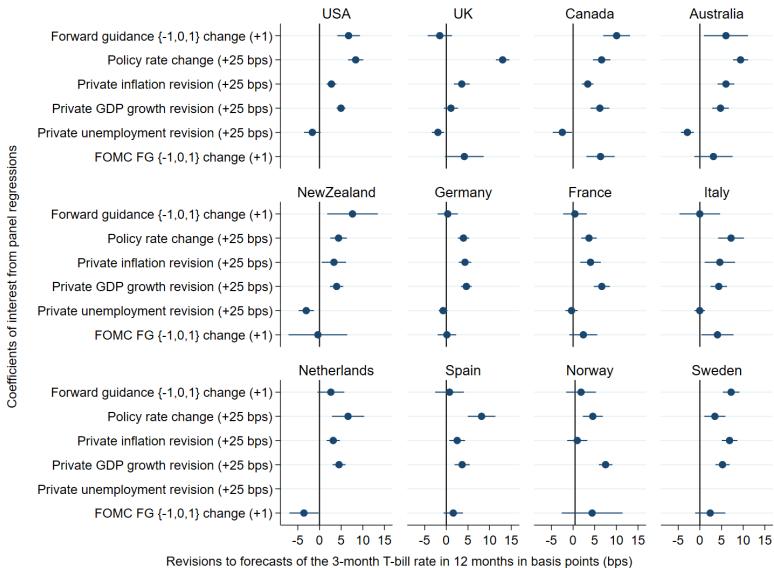
Very unexpected forward guidance and forecast uncertainty

	[1]	[2]	[3]	[4]
(1) Forward guidance (FG) $\{-1,0,1\}$ change	1.92	4.71***	2.43**	2.22*
	(1.80)	(0.86)	(0.98)	(1.15)
(2) Very unexpected FG change $\{0,1\}$	1.51	-0.30	-0.14	1.60
	(2.33)	(1.35)	(2.56)	(2.13)
(3) Lagged interest rate disagreement (σ_{t-1})	-1.60**	-2.27***	0.18	-0.69*
	(0.58)	(0.44)	(0.36)	(0.33)
(1) x (2)	5.65***	4.13***	0.18	1.72*
	(0.98)	(1.10)	(1.28)	(0.89)
(1) x (3)	-1.93	2.95***	1.65	0.54
	(1.54)	(0.74)	(1.62)	(1.32)
(2) x (3)	-0.58	-2.10	0.43	3.75**
	(4.97)	(2.25)	(2.46)	(1.69)
(1) x (2) x (3)	3.44	0.92	-2.16	0.47
	(3.27)	(2.27)	(1.94)	(1.47)
Adjusted R^2	0.36	0.22	0.29	0.19
N	43564	42973	43369	42687

Dependent variable [1]: revisions to individuals' forecasts, 3-month t-bill rate in 3 months (bps).
Dependent variable [2]: revisions to individuals' forecasts, 3-month t-bill rate in 12 months (bps).
Dependent variable [3]: revisions to individuals' forecasts, 10-year bond yield in 3 months (bps).
Dependent variable [4]: revisions to individuals' forecasts, 10-year bond yield in 12 months (bps).
Standard errors clustered at the country level. Regressions include both firm and month fixed effects.
Control variables suppressed for brevity. * $p < 0.10$, ** $p < 0.05$, *** $p < 0.01$

Isolating the forward guidance effect