

Managing Expectations: Instruments vs. Targets

George-Marios Angeletos¹ and Karthik Sastry²

¹MIT and NBER, ²MIT

14.06, May 12, 2020

Monetary policy: setting interest rates

A machine that spits out R ?



Monetary policy: talking, guiding, communicating...

Search

Bloomberg

Sign In

Economics

Fed Scraps Patient Approach and Opens Door to Potential Rate Cut

By [Craig Torres](#) and [Christopher Condon](#)

June 19, 2019, 2:00 PM EDT

Updated on June 19, 2019, 6:03 PM EDT

- ▶ Holds rates steady for now as 8 officials project cuts in 2019
- ▶ Fed Chair Powell says he fully intends to serve four-year term



Powell Says Many FOMC Members See Rate Cut as Appropriate

When I was at the Federal Reserve, I occasionally observed that monetary policy is 98 percent talk and only two percent action. The ability to shape market expectations of future policy through public statements is one of the most powerful tools the Fed has.

Ben Bernanke (Fed Chair, 2006-2014)

Very “human” process, fraught with unique challenges.

Two methods for forward guidance

Instrument communication: “0% interest rates for τ quarters”

FOMC, August 2011: “The Committee currently anticipates... exceptionally low levels for the federal funds rate **at least through mid 2013.**”

Two methods for forward guidance

Instrument communication: “0% interest rates for τ quarters”

FOMC, August 2011: “The Committee currently anticipates... exceptionally low levels for the federal funds rate at least through mid 2013.”

Target communication: “bring unemployment down to $Y\%$ ”

FOMC, December 2012: low rates “... as long as the unemployment rate remains above 6 1/2 percent” + other conditions for inflation, expectations thereof

Mario Draghi, April 2012: “The ECB is prepared to do whatever it takes to preserve the Euro. And, believe me, it will be enough.”

Two methods for forward guidance

Instrument communication: “0% interest rates for τ quarters”

FOMC, August 2011: “The Committee currently anticipates... exceptionally low levels for the federal funds rate at least through mid 2013.”

Target communication: “bring unemployment down to $Y\%$ ”

FOMC, December 2012: low rates “. . . as long as the unemployment rate remains above 6 1/2 percent” + other conditions for inflation, expectations thereof

Mario Draghi, April 2012: “The ECB is prepared to do whatever it takes to preserve the Euro. And, believe me, it will be enough.”

Question: when to switch from one to the other?

Context: how were policymakers thinking about it?

Redirecting attention

[W]e are shining a very bright spotlight on the unemployment rate. . . . When we stated a specific date for lift-off, the spotlight was cast on the calendar, and that's what everyone focused on, for better or for worse. Once we start talking in terms of an unemployment threshold, it will be the unemployment rate that takes center stage.

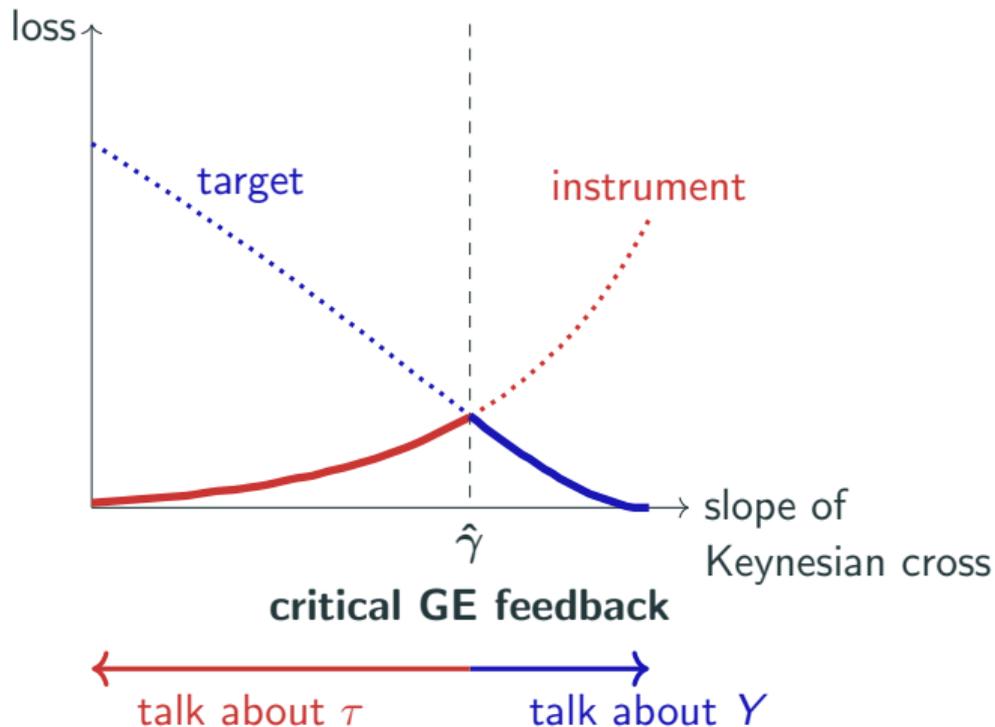
John C. Williams, Dec. 2012

Achieving clarity

[Communicating dates] is a pretty indirect way to get across our message. We can provide much more clarity to the public by making a statement in terms of well-known indicators, like unemployment and inflation, of the economic conditions we'll need to see before considering raising rates.

Charles Evans, Dec. 2012

Key result: threshold GE feedback to switch methods



- ▶ **This paper:** does the more rigorous, game-theoretic analysis agree with the previous?
 - ▶ **Main result:** Start talking about targets when feedback mechanisms are strong = refinement of previous
 - ▶ Optimal switch minimizes effects of bounded rationality on outcomes
- vs. Poole, 1970; Weitzman, 1974

Set-up

Model equations: actions depend on beliefs

$C = \int_i c_i di =$ average action today

$Y =$ outcome (target) in the future

$\tau =$ instrument in the future

$$c_i = (1 - \gamma)\mathbb{E}_i[\tau] + \gamma\mathbb{E}_i[Y]$$

$\gamma \in (0, 1) =$ GE feedback

Model equations: actions depend on beliefs and commitment can be met

$C = \int_i c_i di =$ average action today

$Y =$ outcome (target) in the future

$\tau =$ instrument in the future

$$c_i = (1 - \gamma)\mathbb{E}_i[\tau] + \gamma\mathbb{E}_i[Y]$$

$\gamma \in (0, 1) =$ GE feedback

Final outcome depends on realized behavior and policy

$$Y = (1 - \alpha)\tau + \alpha C$$

$\alpha \in (0, 1)$ parameterizes direct policy effect

Model equations: actions depend on beliefs and commitment can be met

$C = \int_i c_i di =$ average action today

$Y =$ outcome (target) in the future

$\tau =$ instrument in the future

$$c_i = (1 - \gamma)\mathbb{E}_i[\tau] + \gamma\mathbb{E}_i[Y]$$

$\gamma \in (0, 1) =$ GE feedback

Final outcome depends on realized behavior and policy

$$Y = (1 - \alpha)\tau + \alpha C$$

$\alpha \in (0, 1)$ parameterizes direct policy effect

New Keynesian micro-foundation (in paper)

$C =$ spending today

$Y =$ permanent income

$\tau =$ time at ZLB

$\gamma =$ wealth (GE) effect

$\alpha < 1 =$ can delay liftoff

Timing

$t = 0$ (FOMC meeting): PM announces

either $\tau = \hat{\tau}$ (IC) or $Y = \hat{Y}$ (TC)

$t = 1$ (liquidity trap): Agents form beliefs and choose c_i

$t = 2$ (exit): (Y, τ, C) realized

The policy problem (quadratic loss)

$$\min_{\theta \mapsto \{\text{message}, (\tau, Y)\}} \mathbb{E}[(1 - \chi)(\tau - \theta)^2 + \chi(Y - \theta)^2]$$

s.t. (τ, Y) is implementable in equil given

eq. (1)-(2) and message $\tau = \hat{\tau}$ or $Y = \hat{Y}$

Timing

$t = 0$ (FOMC meeting): PM announces

either $\tau = \hat{\tau}$ (IC) or $Y = \hat{Y}$ (TC)

$t = 1$ (liquidity trap): Agents form beliefs and choose c_i

$t = 2$ (exit): (Y, τ, C) realized

Benchmark: irrelevance

unique REE satisfies

$$Y = C = \tau$$

communication methods are equivalent

The policy problem (quadratic loss)

$$\min_{\theta \mapsto \{\text{message}, (\tau, Y)\}} \mathbb{E}[(1 - \chi)(\tau - \theta)^2 + \chi(Y - \theta)^2]$$

s.t. (τ, Y) is implementable in equil given

eq. (1)-(2) and message $\tau = \hat{\tau}$ or $Y = \hat{Y}$

Results

Imperfect reasoning

Assumption: lack of CK about announcement

Let $X \in \{\tau, Y\}$ be the announcement. Agents are rational and attentive but think only fraction $\lambda \in [0, 1)$ of others is attentive:

$$\mathbb{E}_i[X] = X \quad \mathbb{E}_i[\bar{\mathbb{E}}[X]] = \lambda \mathbb{E}_i[X] \quad (1)$$

- ▶ **Behavioral story:** imperfect reasoning in games (level K , cognitive discounting) like Nagel (1995); Heinemann, Nagel and Ockenfels (2009); Crawford, Costa-Gomes and Iriberri (2013)
- ▶ **“Classical” (game theoretic) story:** frictions in HOB like Morris and Shin (2002), Abreu and Brunnermeier (2003), global games literature, Woodford (2003)
- ▶ Key shared implication: **Anchored Beliefs**

$$\bar{\mathbb{E}}[C] = \lambda C$$

Main result: targets when GE feedback is high

Theorem: optimal communication

Assume structure (1) for beliefs. There exists a $\hat{\gamma} \in (0, 1)$ (“critical GE feedback”) such that

- ▶ $\gamma < \hat{\gamma}$: optimal to communicate instrument
- ▶ $\gamma \geq \hat{\gamma}$: optimal to communicate target

Proof Sketch.

1. Breaking irrelevance: distortion attenuates power of IC and amplifies power of TC, relative to frictionless case
2. Comparative static: As $\gamma \uparrow$, first distortion \uparrow and second \downarrow
3. Optimality: Only distortion, so TC \succ IC if and only if γ large enough



Instrument communication \rightarrow **attenuation increasing in γ**

$$C = (1 - \gamma)\bar{\mathbb{E}}[\tau] + \gamma\bar{\mathbb{E}}[Y]$$

Instrument communication \rightarrow attenuation increasing in γ

$$C = (1 - \gamma)\bar{\mathbb{E}}[\tau] + \gamma\bar{\mathbb{E}}[Y]$$

(reasoned by agents)

$$= (1 - \alpha)\bar{\mathbb{E}}[\tau] + \alpha\bar{\mathbb{E}}[C]$$

$= \tau$ (fixed by FG)

Instrument communication \rightarrow attenuation increasing in γ

$$C = (1 - \gamma)\bar{\mathbb{E}}[\tau] + \gamma\bar{\mathbb{E}}[Y]$$

(reasoned by agents)
 $= (1 - \alpha)\bar{\mathbb{E}}[\tau] + \alpha\bar{\mathbb{E}}[C]$

$= \tau$ (fixed by FG)

$$C = (1 - \delta_\tau)\tau + \delta_\tau\bar{\mathbb{E}}[C]$$

$\alpha\gamma \in (0, 1)$

► Game of **complements**

“I expect less spending and income, so I spend less”

► Friction **reduces** response of C

cf. Angeletos & Lian (2018), Farhi & Werning (2018), Gabaix (2018), Garcia-Schmidt & Woodford (2019)

► **More so with large γ**

Target communication \rightarrow amplification decreasing in γ

$$C = (1 - \gamma)\bar{\mathbb{E}}[\tau] + \gamma\bar{\mathbb{E}}[Y]$$

Target communication \rightarrow amplification decreasing in γ

$$C = (1 - \gamma)\bar{\mathbb{E}}[\tau] + \gamma\bar{\mathbb{E}}[Y]$$

(reasoned by agents)

$$= \frac{1}{1-\alpha}\bar{\mathbb{E}}[Y] - \frac{\alpha}{1-\alpha}\bar{\mathbb{E}}[C]$$

$\rightarrow = Y$ (fixed by FG)

Target communication \rightarrow amplification decreasing in γ

$$C = (1 - \gamma)\bar{\mathbb{E}}[\tau] + \gamma\bar{\mathbb{E}}[Y]$$

$\xrightarrow{\text{(reasoned by agents)}} = \frac{1}{1-\alpha}\bar{\mathbb{E}}[Y] - \frac{\alpha}{1-\alpha}\bar{\mathbb{E}}[C]$

$\xrightarrow{\text{= } Y \text{ (fixed by FG)}}$

$$C = (1 - \delta_Y)Y + \delta_Y\bar{\mathbb{E}}[C]$$

$-\frac{(1-\gamma)\alpha}{1-\alpha} \leq 0$

► Game of **substitutes**

“I expect less spending, so I expect looser policy and spend *more*”

► Friction **increases** response of C

Turns FG literature upside down

► **Less so with large** γ

Target communication \rightarrow amplification decreasing in γ

$$C = (1 - \gamma)\bar{\mathbb{E}}[\tau] + \gamma\bar{\mathbb{E}}[Y]$$

$\xrightarrow{\text{(reasoned by agents)}} = \frac{1}{1-\alpha}\bar{\mathbb{E}}[Y] - \frac{\alpha}{1-\alpha}\bar{\mathbb{E}}[C]$

$\xrightarrow{\text{= } Y \text{ (fixed by FG)}}$

$$C = (1 - \delta_Y)Y + \delta_Y\bar{\mathbb{E}}[C]$$

$-\frac{(1-\gamma)\alpha}{1-\alpha} \leq 0$

► Game of **substitutes**

“I expect less spending, so I expect looser policy and spend *more*”

► Friction **increases** response of C

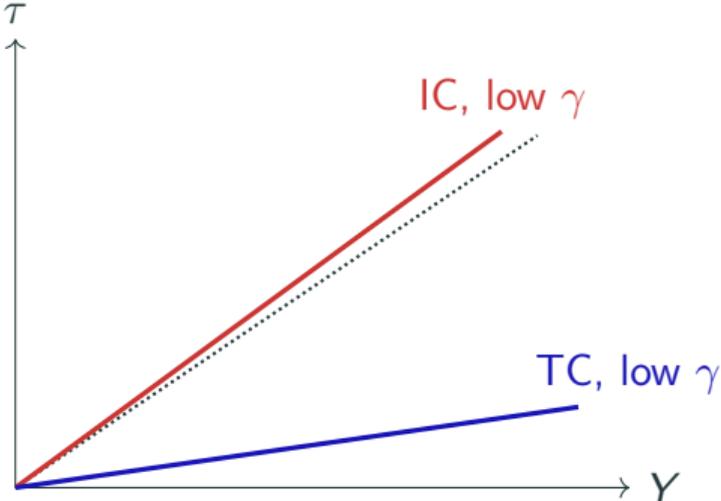
Turns FG literature upside down

► **Less so with large** γ

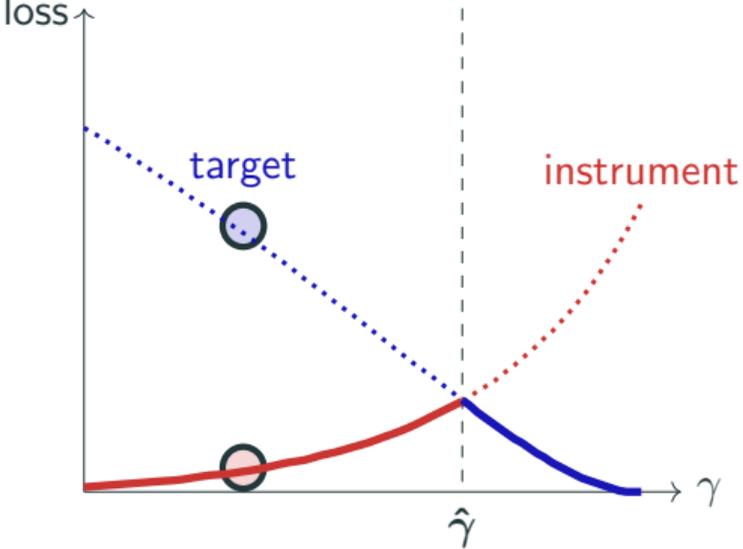
► Key idea: “confidence about what to do” jointly endogenous to state γ and communication type $X \in \{\tau, Y\}$

Optimal policy minimizes distortion in implementation

Implementable combinations of (τ, Y)



Loss functions of two methods

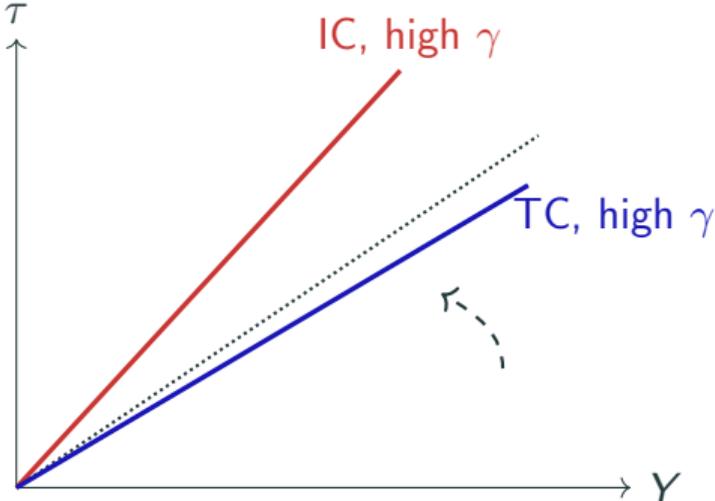


critical GE feedback

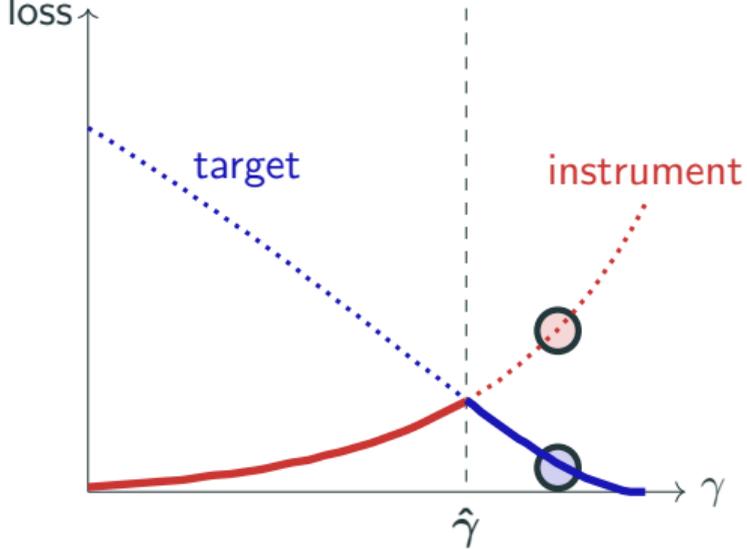
talk about τ talk about Y 12

Optimal policy minimizes distortion in implementation

Implementable combinations of (τ, Y)



Loss functions of two methods



critical GE feedback



Robust to more arbitrary belief frictions

Theorem: arbitrary distortions

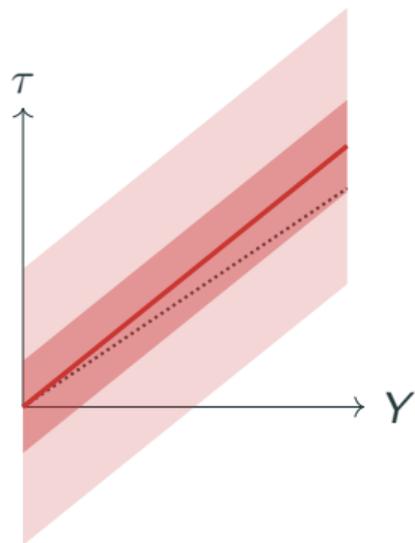
Assume beliefs satisfy $\bar{\mathbb{E}}[C] = \lambda C + \sigma \epsilon$ for $\lambda > 0$ and $\neq 1$; $\sigma \geq 0$; and $\epsilon \sim N(0, 1)$. There still exists a $\hat{\gamma} \in (0, 1)$ such that target communication is optimal iff $\gamma > \hat{\gamma}$.

Robust to more arbitrary belief frictions

Theorem: arbitrary distortions

Assume beliefs satisfy $\bar{\mathbb{E}}[C] = \lambda C + \sigma \epsilon$ for $\lambda > 0$ and $\neq 1$; $\sigma \geq 0$; and $\epsilon \sim N(0, 1)$. There still exists a $\hat{\gamma} \in (0, 1)$ such that target communication is optimal iff $\gamma > \hat{\gamma}$.

Corollary. Exists a critical $\hat{\gamma} \in (0, 1)$ for policymaker uncertain about extent or type of bounded rationality within this class



Limited control of implementation
(shaded area = probability) from
bounded rationality

compare with Poole, 1970; Aleskron, Chari,
Kehoe, 2007

Discussion

Lessons for forward guidance: context matters

- ▶ “Clarity”: alignment of public’s and PM’s beliefs
- ▶ Theory relates with GE reasoning, makes new predictions
Confronting data, from Andrade et al., 2019; Ehrmann et al., 2019?
- ▶ “Insulating economy from GE reasoning” = virtuous cycle

General equilibrium
story: FG is ...
easy to understand
 γ \updownarrow i vs. t
more effective

Lessons for forward guidance: context matters

- ▶ “Clarity”: alignment of public’s and PM’s beliefs
- ▶ Theory relates with GE reasoning, makes new predictions
Confronting data, from Andrade et al., 2019; Ehrmann et al., 2019?
- ▶ “Insulating economy from GE reasoning” = virtuous cycle
- ▶ High γ = large wealth effects, binding liquidity constraints, long period in liquidity trap

▶ more results

▶ quotations

▶ smooth policy

▶ FG examples

General equilibrium
story: FG is ...

easy to understand

γ \updownarrow i vs. t

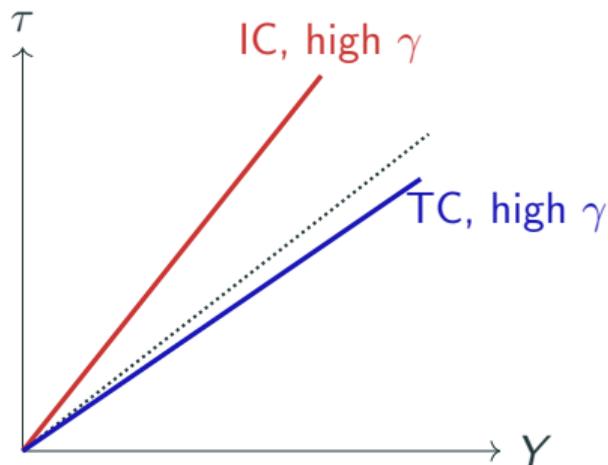
more effective

talk about Y, u in
severe demand
recession

Implementable sets in practice

From “3 Words and \$3 Trillion: The Inside Story of How Mario Draghi Saved the Euro” by Jana Randow and Alessandro Speciale for Bloomberg (November 2018)

After his pledge at Lancaster House to do whatever it takes, Draghi returns to Frankfurt and puts his staff to work turning half-formed plans into a viable program. Some heads of government and central bankers might take Draghi to task for not having a more fully formed strategy in the first place, but not Christian Noyer, the former governor of the Bank of France who was part of Draghi’s inner circle. Draghi knew what he was doing, Noyer says: **“He was relying on the capacity of the system to invent it. That’s what I call genius intuition.”**



*Communication changes what is
implementable*

Summary

Managing expectations in a crisis

- ▶ Tilt focus from R path to u, Y when feedback loops are strong
- ▶ Robust to multiple possible behavioral frictions

Summary, other applications in the paper

Managing expectations in a crisis

- ▶ Tilt focus from R path to u, Y when feedback loops are strong
- ▶ Robust to multiple possible behavioral frictions and confounding (CK) shocks

Arresting bounded rationality by communicating reaction function

- ▶ Smooth transition from instrument to target approach as feedback increases (policy rule steepens from Neoclassical regime to liquidity trap)

Summary, other applications in the paper, and areas to explore

Managing expectations in a crisis

- ▶ Tilt focus from R path to u, Y when feedback loops are strong
- ▶ Robust to multiple possible behavioral frictions and confounding (CK) shocks

Arresting bounded rationality by communicating reaction function

- ▶ Smooth transition from instrument to target approach as feedback increases (policy rule steepens from Neoclassical regime to liquidity trap)

Going back to the data, quantitative implementation

More applications: optimal Taylor rules, relation with Taylor principle, interaction with commitment problems, . . .

Backup slides

What's the point of target communication?

▸ back 1

▸ back 2

Redirecting attention

[W]e are shining a very bright spotlight on the unemployment rate. . . . When we stated a specific date for lift-off, the spotlight was cast on the calendar, and that's what everyone focused on, for better or for worse. Once we start talking in terms of an unemployment threshold, it will be the unemployment rate that takes center stage.

John C. Williams, Dec. 2012

Achieving clarity

[Communicating dates] is a pretty indirect way to get across our message. We can provide much more clarity to the public by making a statement in terms of well-known indicators, like unemployment and inflation, of the economic conditions we'll need to see before considering raising rates.

Charles Evans, Dec. 2012

More forward guidance [▶ back](#)

	Institution	Date	Source	Type	Statement Excerpt
(1)	US Federal Reserve	Aug 9, 2011	Policy statement by Committee	Instrument	[T]he Committee decided today to keep the target range for the federal funds rate at 0 to 1/4 percent. The Committee currently anticipates that economic conditions—including low rates of resource utilization and a subdued outlook for inflation over the medium run—are likely to warrant exceptionally low levels for the federal funds rate at least through mid-2013
(2)	US Federal Reserve	Dec 12, 2012	Policy statement by Committee	Target	[T]he Committee decided to keep the target range for the federal funds rate at 0 to 1/4 percent and currently anticipates that this exceptionally low range for the federal funds rate will be appropriate at least as long as the unemployment rate remains above 6-1/2 percent, inflation between one and two years ahead is projected to be no more than a half percentage point above the Committee's 2 percent longer-run goal, and longer-term inflation expectations continue to be well anchored.
(3)	Bank of Canada	Apr 21, 2009	Press release	Instrument	With monetary policy now operating at the effective lower bound for the overnight policy rate, it is appropriate to provide more explicit guidance than is usual regarding its future path so as to influence rates at longer maturities. Conditional on the outlook for inflation, the target overnight rate can be expected to remain at its current level until the end of the second quarter of 2010 in order to achieve the inflation target. The Bank will continue to provide such guidance in its scheduled interest rate announcements as long as the overnight rate is at the effective lower bound.
(4)	Sveriges Riksbank (Sweden)	Apr 21, 2009	Press release	Instrument	The Executive Board of the Riksbank has decided to cut the repo rate by 0.5 percentage points to 0.5 per cent. The lower interest rate and interest rate path are necessary to dampen the fall in production and employment and to attain the inflation target of 2 per cent. The repo rate is expected to remain at a low level until the beginning of 2011.
(5)	Bank of Japan	Apr 4, 2013	Press release	Target	The Bank will achieve the price stability target of 2 percent in terms of the year-on-year rate of change in the consumer price index (CPI) at the earliest possible time, with a time horizon of about two years. In order to do so, it will enter a new phase of monetary easing both in terms of quantity and quality.
(6)	Bank of England	Aug 7, 2013	Letter from Governor Mark Carney	Target	In practice, that means the [Monetary Policy Committee] intends not to raise Bank Rate above its current level of 0.5%, at least until the Labour Force Survey headline measure of unemployment has fallen to a threshold of 7%. While the unemployment rate remains above 7%, the MPC stands ready to undertake further asset purchases if additional stimulus is warranted.
(7)	European Central Bank	Jul 26, 2012	Speech by President Mario Draghi	Target	But there is another message I want to tell you. Within our mandate, the ECB is ready to do whatever it takes to preserve the Euro. And believe me, it will be enough.

Preference for target communication is weakly

- ▶ decreasing in α : less ability to meet commitment
- ▶ increasing in λ : bounded rationality always bites harder for TC
- ▶ increasing in χ : care more about output gap

Policy rules and “smooth transitions” [▶ back](#)

Announce a linear policy rule: $\tau = A - BY$

Optimal (A, B) indeterminate in RE benchmark

Proposition: optimal linear policy with distorted beliefs

For each γ , there exists $(A^*(\gamma), B^*(\gamma))$ that uniquely solves the policy problem for all (λ, σ) . $B^*(\gamma)$ increases in γ . The policy rule achieves first-best.

- ▶ High $\gamma \rightarrow$ tilt toward TC (“smoothed result”)
- ▶ **New perspective on policy rules**
 - Optimal = reduces bite of bounded rationality
 - Uniqueness in tiny deviations from frictionless case