

# Managing Expectations without RE: Instruments versus Targets

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## How to Manage Expectations?

- ▶ **Instruments:** “will maintain 0% interest rates for  $\tau$  quarters”
- ▶ **Targets:** “will bring unemployment down to  $Y\%$ ”

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## **Instrument Communication**

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

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## **Target Communication** (reserved?)

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## Instrument Communication

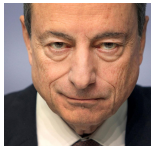
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## Target Communication (resolute?)

“do whatever it takes” (and perhaps won't bother to tell you *how*)

# Instrument vs Target Communication

- ▶ Reason to prefer one over the other?
- ▶ **NO** in benchmark with **“Ramsey world”**
  - (i) Full credibility
  - (ii) No future shocks (or policy contingent on them)
  - (iii) Rational Expectations + Common Knowledge

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  - (iii) ~~Rational Expectations | Common Knowledge~~

Our focus

Relax (iii) and explore role of bounded rationality

# Main Lesson

## Optimal Forward Guidance

- ▶ Instrument communication when GE feedback is weak
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Stop talking about  $R$  and start talking about  $u$ ,  $Y$  when:

- ✓ long ZLB
- ✓ steep Keynesian cross
- ✓ strong financial accelerator



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Rationale: help minimize

- ✓ agents' need to "reason about the economy"
- ✓ distortion due to bounded rationality
- ✓ lack of confidence

# Literature

- ▶ **Instruments vs Targets**

Poole (1970), Weitzman (1974), Taylor rules

- ▶ **Micro-foundations of Beauty Contests**

RBC: Angeletos & La'O (2010, 2013), Huo & Takayama (2015)

NK: Angeletos & Lian (2018), Farhi & Werning (2018)

- ▶ **Forward Guidance, GE Attenuation and Myopia**

Angeletos & Lian (2016, 2018): HOB

Farhi & Werning (2018), Garcia-Schmidt & Woodford (2018): Level k

Gabaix (2018): cognitive discounting

- ▶ **Communication in Beauty Contests, Information Design**

Morris & Shin (2002, 2007), Angeletos & Pavan (2007)

Kamenica & Gentzkow (2011), Bergemann & Morris (2013, 2018)

# Model

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## Notation and Behavior

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

$Y$  = outcome (target) in the future

$\tau$  = instrument in the future

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

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Story (microfoundation in paper)

ZLB today, but not tomorrow

$C$  = spending today;  $Y$  = income today plus tomorrow

$\tau$  = minus interest rate tomorrow (or for how long thereafter)

$\gamma$  = Keynesian multiplier

## Outcome

Final outcome depends on realized behavior and policy

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

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

Story (microfoundation in paper)

Loose policy tomorrow  $\rightarrow$  higher output tomorrow

## The Model (just 2 equations!)

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

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- ▶ Instrument communication: know  $\tau$ , have to think about  $Y$
- ▶ **Target communication:** know  $Y$ , have to think about  $\tau$

## Timing

$t = 0$  (FOMC meeting): PM sees  $\theta$  (ideal point) and 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):  $C$ ,  $\tau$  and  $Y$  are realized

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## The Policy Problem

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

s.t.  $(\tau, Y)$  is implementable in equil given

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

## Frictionless, REE Benchmark

Benchmark  $\equiv$  representative, rational and attentive agent  
(CK of both announcement and rationality)

$\implies$  no error in predicting behavior of others:

$$\mathbb{E}_i[C] = C$$

$\implies$  any equilibrium satisfies

$$c_i = C = Y = \tau$$

$\implies$  irrelevant whether PM announces  $\tau$  or  $Y$   
(equivalence of primal and dual problems)

## Friction: Lack of CK / Anchored Beliefs

- Assumption: Lack of CK of 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:

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  - HOB in incomplete-info settings
  - Level-C Thinking: same essence, but a “bug”
  - Cognitive discounting: same for GE, but adds PE distortion
- ▶ Key shared implication: Anchored Beliefs

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



# Main Results

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# Preview of Argument

## 1. Friction **attenuates** power of FG under IC

Angeletos & Lian (AER2018), Farhi & Werning (2018), Gabaix (2018)

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3. Role of GE: As  $\gamma \uparrow$ , first distortion  $\uparrow$  and second  $\downarrow$

4. **Optimality:** TC  $\succ$  IC if and only if  $\gamma$  large enough

## IC: Game after Announcing $\tau$

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► Game of **complements**

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

► Friction **reduces** effectiveness of FG

Stylizes Angeletos & Lian (2018), Farhi & Werning (2018), Gabaix (2018), Garcia-Schmidt & Woodford (2018)

## TC: Game after Announcing $Y$

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

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

(reasoned by agents)

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

$\bar{\mathbb{E}}[Y] = Y$  (fixed by FG)

## TC: Game after Announcing $Y$

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(reasoned by agents)

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$\rightarrow = Y$  (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** effectiveness of FG

Turns FG literature upside down

# Implementability

Proposition: implementable sets

$$\{(\tau, Y) : \tau = \mu_{\tau}(\gamma, \lambda) Y\}$$

Instrument communication

$$\{(\tau, Y) : \tau = \mu_Y(\gamma, \lambda) Y\}$$

Target communication

attenuation  $\leftarrow \mu_{\tau}(\gamma, \lambda) > 1 > \mu_Y(\gamma, \lambda) \rightarrow$  amplification

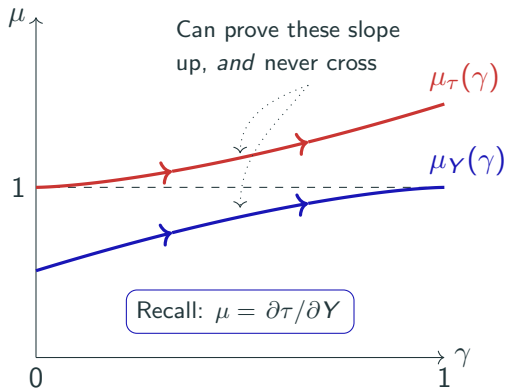
- ▶ Friction  $\neq$  “everything is dampened”
- ▶ TC keeps powder dry

# The Role of the GE Feedback

## Proposition

$$\partial \mu_{\tau} / \partial \gamma > 0$$

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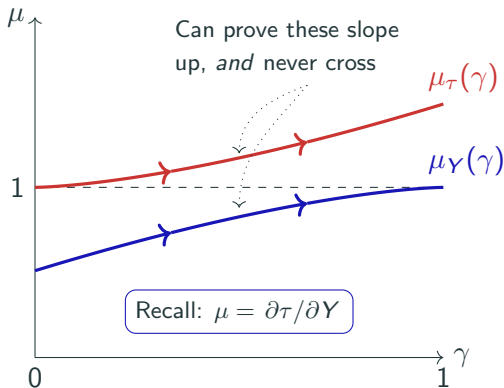
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$$\partial \mu_{Y} / \partial \gamma > 0$$

### Quick intuition

Distortion from reasoning about what is not announced

High  $\gamma \rightarrow$  very important to figure out  $Y$ , not so much  $\tau$



as  $\gamma$  (GE) increases  $\Rightarrow$   $\left\{ \begin{array}{l} \text{distortion under IC increases} \\ \text{distortion under TC decreases} \end{array} \right.$

## Main Result

### Theorem: optimal communication

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



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*Additional results in paper:*

precise values of optimal message and attained  $(\tau, Y)$

variant with Level-k Thinking

Level-k

## **Application: Forward Guidance at the Zero Lower Bound**

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## Forward Guidance at ZLB

- ▶ Angeletos & Lian (AER 2018)
  - lack of CK attenuates GE effects of FG
  - longer horizon  $\Rightarrow$  longer GE chains  $\Rightarrow$  more distortion

details

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▶ Farhi & Werning (2018)

- similar attenuation with Level-k Thinking
- inco markets  $\Rightarrow$  steeper Keynesian cross  $\Rightarrow$  more distortion

▶ See also Garcia & Woodford (2018), Gabaix (2018), Iovino & Sergeyev (2018), Andrade, Gaballo, Mengus & Mojon (2018)

## Forward Guidance at ZLB

- ▶ Our paper: bypass friction with **target communication**
  - “stop talking about  $R$ , start talking about  $Y$  or  $U$ ”
  - preferable when **longer ZLB** or **steeper Keynesian cross**
- ▶ Reminiscent of Mario Draghi’s “do whatever it takes”
  - relies on strong GE feedback but not multiple equilibria
  - common logic: alleviate concerns about behavior of others

## Broader Scope

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## Generalized Departure from RE

- ▶ Misspecified beliefs:

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

where  $\lambda, \sigma > 0$  and  $\epsilon$  is orthogonal to  $\theta$

- ▶ Nests:
  - under-reaction ( $\lambda < 1$ ): FG literature
  - over-reaction ( $\lambda > 1$ ): Shleifer et al
  - noise or animal spirits ( $\sigma > 0$ )

## Generalized Departure from RE

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- ▶ Optimal policy result goes through

- intuition: all about limiting the role of  $\bar{\mathbb{E}}[C]$
- i.e., “more thinking = more distortion” result extends



# Policy Rules

- ▶ Announce a linear rule:

$$\tau = \phi_0 - \phi_y Y$$

(e.g., state-contingent “intercept” and “slope” of Taylor rule)

- ▶ RE ( $\lambda = 1$ )  $\Rightarrow$  optimal  $(\phi_0, \phi_y)$  is **indeterminate**

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Optimal rule with bounded rationality ( $\lambda < 1$ )

- ▶ **Determinacy**: unique optimal  $(\phi_0^*, \phi_y^*)$
  - ▶ **GE**: optimal  $\phi_y^*$  increases with GE multiplier ( $\gamma$ )
- 
- ▶ I.e., **smoothed** version of earlier result:  
higher  $\gamma \rightarrow$  tilt toward target communication

## Conclusion

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## Take-Home Lessons

### How to communicate / manage expectations?

- ▶ Tilt focus from  $R$  path to  $u, Y$  targets when feedback loops are strong

### New perspective on Taylor rules

- ▶ Traditional: demand vs supply shocks
- ▶ Here: arrest bounded rationality or nearly self-fulfilling traps

### Extend logic from multiple equil (Mario Draghi) to unique equil

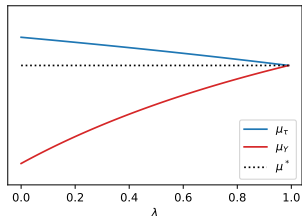
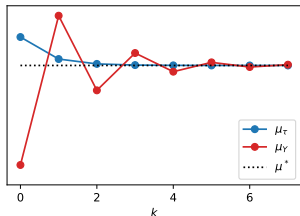
- ▶ large multipliers  $\rightarrow$  HOB critical  $\rightarrow$  “nearly” self-fulfilling  $\rightarrow$

## **Supplementary Material**

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## Level- $k$ : Similar but Less Sharp

- ▶ **Instrument comm** (games of complements): **the same**
  - others are less rational  $\approx$  others are less attentive
- ▶ **Target comm** (games of substitutes): **a bug**
  - distortion changes sign between even and odd  $k$

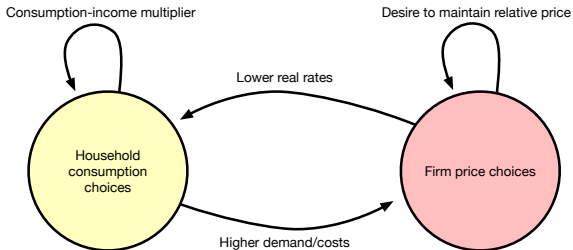


- ▶ Our preferred formulation avoids the bug
- ▶ Cognitive discounting avoids it too (but confounds PE-GE)

◀ go back

## FG: Three GE Feedbacks

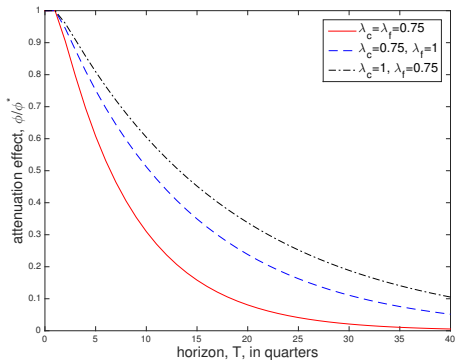
1. Within Dynamic IS: Keynesian cross
2. Within NKPC: dynamic pricing complementarity
3. Across: inflation-spending feedback



- ▶ All three: intensify with length of ZLB / horizon of FG

## FG: Numerical Illustration

- ▶ Textbook NK model, with modest friction ( $\lambda = .75$ )



- ▶ Attenuation by **90%** when ZLB last 5 years
- ▶ Plus, discontinuity at infinite horizons