# 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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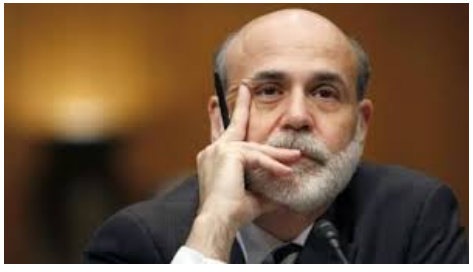

**Instrument Communication**

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

January 2012: horizon extended to " ... at least through late 2014."

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**Target Communication** (reserved?)

December 2012: "... 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 2.5%], and longer-term inflation expectations continue to be well anchored.

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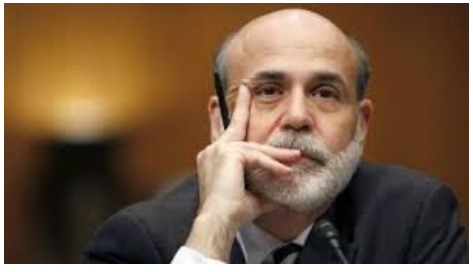

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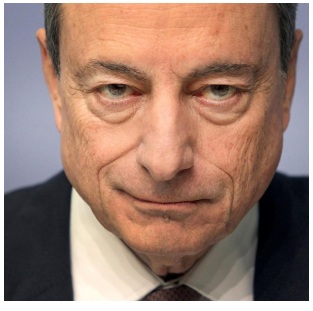

**Target Communication** (resolute?)

"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
  (i) Full credibility
  (ii) No future shocks (or policy contingent on them)
  (iii) Rational Expectations + Common Knowledge

**"Ramsey world"**

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**Our focus**

Relax (iii) and explore role of bounded rationality

# Main Lesson

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

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- ✓ strong financial accelerator

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Stop talking about $R$ and start talking about $u$, $Y$ when:

- ✓ long ZLB
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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

# Notation and Behavior

$C = \int_i c_i \, \mathrm{d}i$ = 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!)

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

$$Y = (1 - \alpha)\tau + \alpha C \tag{2}$$

# **The Model** (just 2 equations!) **and the Key Issue**

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

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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)

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

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

$\Longrightarrow$ any equilibrium satisfies

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

$\Longrightarrow$ 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
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  - 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

# Preview of Arguement

1. Friction attenuates power of FG under IC

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

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2. Friction amplifies power of FG under TC

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 $\tau$

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

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(reasoned by agents)

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

$= \tau$ (fixed by FG)

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$$= \tau \text{ (fixed by FG)}$$

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

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

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

- 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 $Y$

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

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

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

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

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

- Game of **substitutes**

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

- Friction **increases** effectiveness of FG

  Turns FG literature upside down

# Implementability

**Proposition: implementable sets**

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

Instrument communication | Target communication

attenuation $\mu_\tau(\gamma, \lambda) > 1 > \mu_Y(\gamma, \lambda)$ amplification

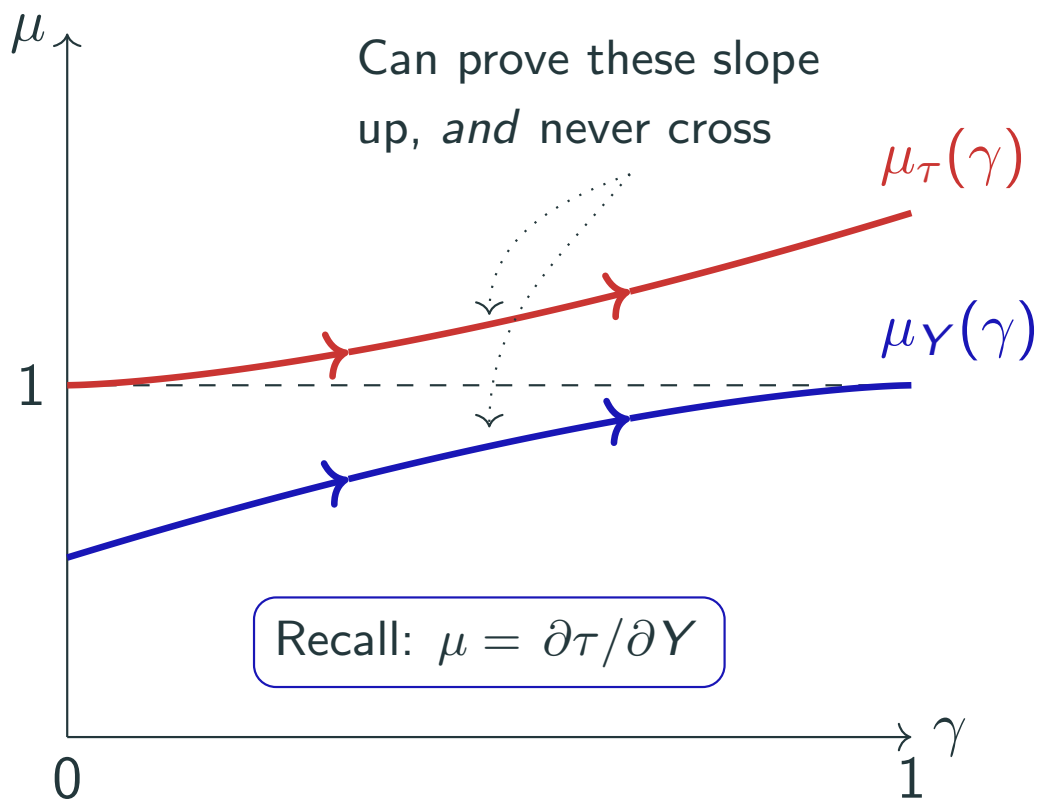
- Friction $\neq$ "everything is dampened"
- TC keeps powder dry

# The Role of the GE Feedback

**Proposition**

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

$\partial \mu_Y / \partial \gamma > 0$



# The Role of the GE Feedback

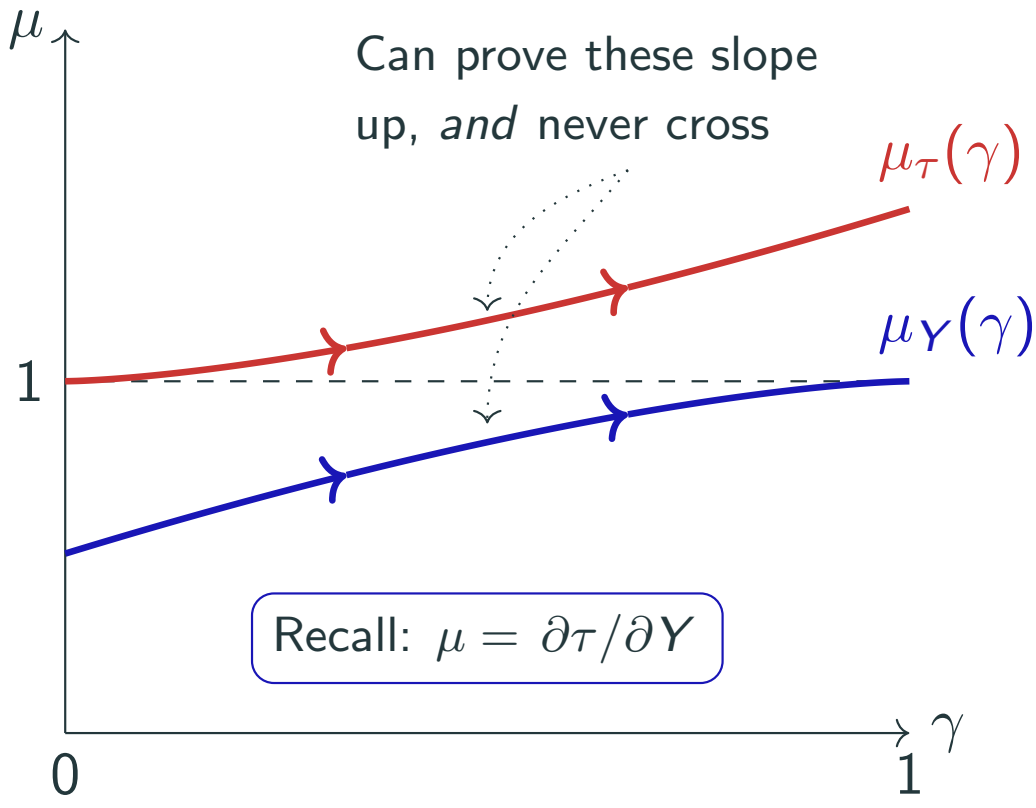
**Proposition**

$$\partial \mu_\tau / \partial \gamma > 0$$
$$\partial \mu_Y / \partial \gamma > 0$$

*Quick intuition*

Distortion from reasoning about what is not announced

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




$$\text{as } \gamma \text{ (GE) increases} \Rightarrow \begin{cases} \text{distortion under IC increases} \\ \text{distortion under TC decreases} \end{cases}$$

# 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
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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

# 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 ⇒ steeper Keynesian cross ⇒ 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

# 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 ($\sigma > 0$)

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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 $(\phi_0^\star, \phi_y^\star)$
- GE: optimal $\phi_y^*$ increases with GE multiplier ($\gamma$)

- I.e., smoothed version of earlier result:
  higher $\gamma \rightarrow$ tilt toward target communication

# Conclusion

# 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

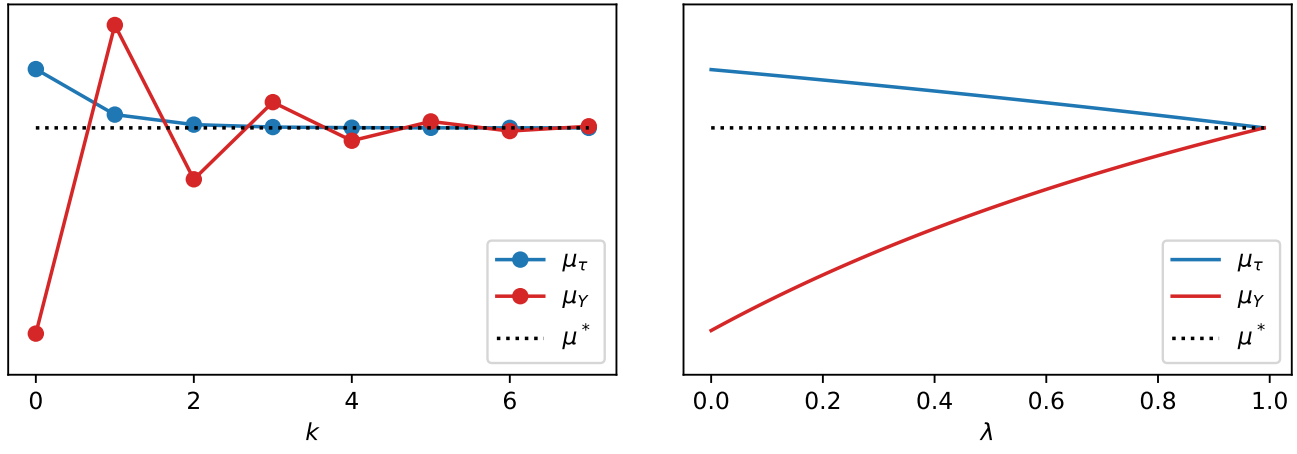
Extend logic from multiple equil (Mario Draghi) to unique equil

- large multipliers $\rightarrow$ HOB critical $\rightarrow$ "nearly" self-fulfilling $\rightarrow$

# Supplementary Material

# 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 $k$



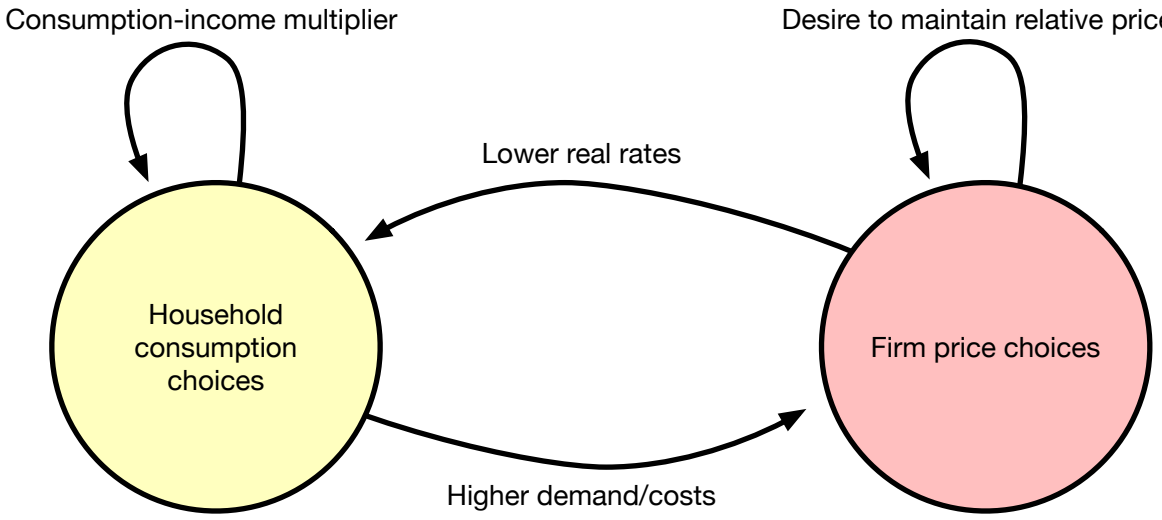

- Our preferred formulation avoids the bug

go back

- Cognitive discounting avoids it too (but confounds PE-GE)

# FG: Three GE Feedbacks

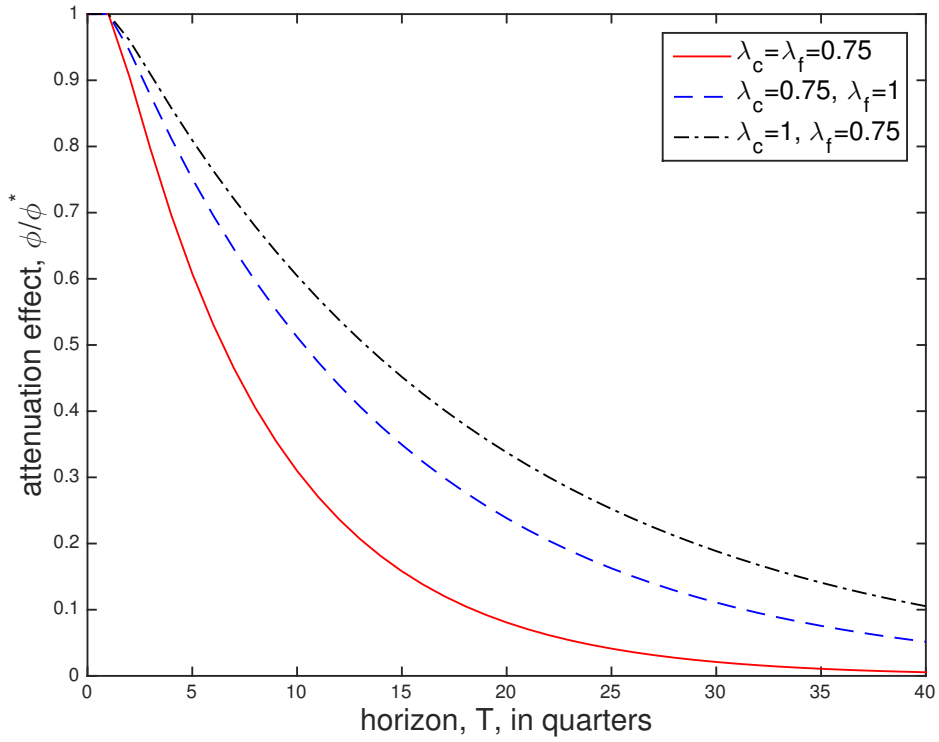
1. Within Dynamic IS: Keynesian cross
2. Within NKPC: dynamic pricing complementarity
3. Across: inflation-spending feedback




- 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

◂ go back