

# Resolving New Keynesian Puzzles

Maria Eskelinen (Oxford)  
Christopher G. Gibbs (Sydney)  
Nigel McClung (Bank of Finland)

**Melbourne Institute Macro Policy Meeting**

October 2025

This research does not reflect views of the Bank of Finland



# Motivation I

## New Keynesian Puzzles at the Zero Lower Bound (ZLB)

- The effective ZLB is a dominant feature of 21<sup>st</sup> century macroeconomic outcomes
- Modeling it properly is central to evaluating past policy and designing better policy
- Standard New Keynesian models used throughout academia and policy institutions predict *puzzling* dynamics at the ZLB



## Motivation II

**Consider forecasting the following policy:**

*... the 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 ... are likely to warrant exceptionally low levels for the federal funds rate at least through mid-2013.*

*- FOMC Statement August, 9<sup>th</sup> 2011*



## Motivation III

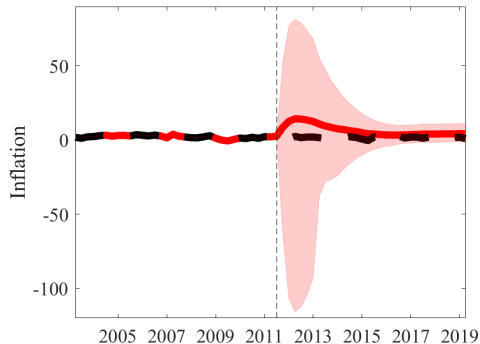
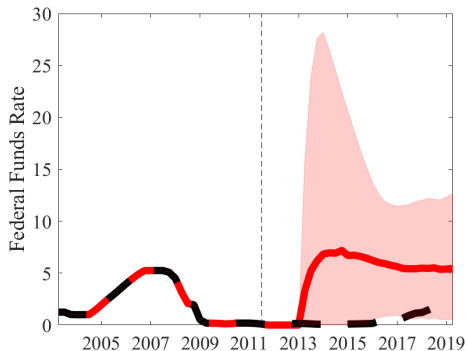
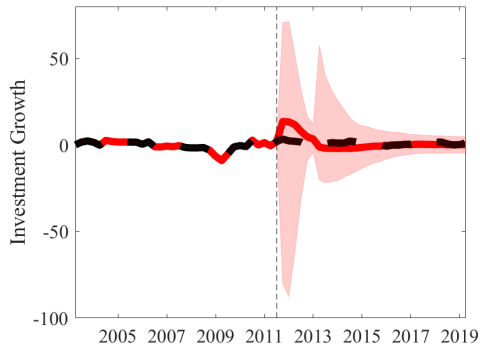
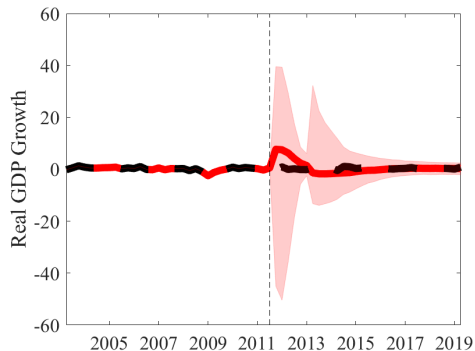


Figure: Smets and Wouters (2007) posterior estimates with data ending in 2004



## Motivation III



**Figure:** Smets and Wouters (2007) posterior estimates with data ending in 2004



# Literature Review

## What's wrong here? Existing literature's answer:

- Forward guidance and even modest ZLB spells are never expected/credible
  - Del Negro, Giannoni, and Patterson (2012, 2023), Haberis, Harrison, and Waldron (2019), Bundick and Smith (2020), Gibbs and McClung (2023)
- Full information rational expectations is implausible
  - Carlstrom, Fuerst, and Pastian (2015), Kiley (2016), Angeletos and Lian (2018), Farhi and Werning (2019), Gabaix (2020)
- The complete market assumption is wrong
  - McKay, Nakamura, and Steinsson (2016, 2017), Bilbiie (2020, 2024)
- Inflation is actually controlled by fiscal policy (Fiscal Theory of the Price Level)
  - Cochrane (2017, 2023)



# Modeling Exercise I

## How should we model the following policy announcement?

*... the 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 ... are likely to warrant exceptionally low levels for the federal funds rate at least through mid-2013.*

*- FOMC Statement August, 9<sup>th</sup> 2011*



# Modeling Exercise II

## Modeling decisions

- 1 Choose a model of the U.S. economy...



# Modeling Exercise II

## Modeling decisions

- 1 Choose a model of the U.S. economy...
  - Smets and Wouters (2007)



# Modeling Exercise II

## Modeling decisions

- ① Choose a model of the U.S. economy...
  - Smets and Wouters (2007)
- ② Choose a monetary policy objective...



# Modeling Exercise II

## Modeling decisions

- ① Choose a model of the U.S. economy...
  - Smets and Wouters (2007)
- ② Choose a monetary policy objective...
  - Stabilize inflation around a target and close the output gap



# Modeling Exercise II

## Modeling decisions

- ① Choose a model of the U.S. economy...
  - Smets and Wouters (2007)
- ② Choose a monetary policy objective...
  - Stabilize inflation around a target and close the output gap
- ③ Choose an interpretation of the policy statement...



# Modeling Exercise II

## Modeling decisions

- ① Choose a model of the U.S. economy...
  - Smets and Wouters (2007)
- ② Choose a monetary policy objective...
  - Stabilize inflation around a target and close the output gap
- ③ Choose an interpretation of the policy statement...
  - Credible commitment to zero interest rates for seven quarters



# Modeling Exercise II

## Modeling decisions

- ① Choose a model of the U.S. economy...
  - Smets and Wouters (2007)
- ② Choose a monetary policy objective...
  - Stabilize inflation around a target and close the output gap
- ③ Choose an interpretation of the policy statement...
  - Credible commitment to zero interest rates for seven quarters
- ④ Choose a policy to implement in expectation following the end of the commitment...



# Modeling Exercise II

## Modeling decisions

- ① Choose a model of the U.S. economy...
  - Smets and Wouters (2007)
- ② Choose a monetary policy objective...
  - Stabilize inflation around a target and close the output gap
- ③ Choose an interpretation of the policy statement...
  - Credible commitment to zero interest rates for seven quarters
- ④ Choose a policy to implement in expectation following the end of the commitment...
  - What does policy do after lift off?



# Modeling Exercise III

## How do we model lift off policy?

- Do you think the monetary policy objectives are the same after before, during, and after the ZLB?



# Modeling Exercise III

## How do we model lift off policy?

- Do you think the monetary policy objectives are the same after before, during, and after the ZLB?
  - *My answer:* Yes! Objectives are the same. ZLB is constraint on an instrument and not a policy regime change.



# Modeling Exercise III

## How do we model lift off policy?

- Do you think the monetary policy objectives are the same after before, during, and after the ZLB?
  - *My answer:* Yes! Objectives are the same. ZLB is constraint on an instrument and not a policy regime change.
- All else equal, do you think that interest rates would rise faster after seven quarters if inflation is above target during the ZLB episode?



# Modeling Exercise III

## How do we model lift off policy?

- Do you think the monetary policy objectives are the same after before, during, and after the ZLB?
  - *My answer:* Yes! Objectives are the same. ZLB is constraint on an instrument and not a policy regime change.
- All else equal, do you think that interest rates would rise faster after seven quarters if inflation is above target during the ZLB episode?
  - *My answer:* Yes! Policy rate normalization is faster.



# Modeling Exercise III

## How do we model lift off policy?

- Do you think the monetary policy objectives are the same after before, during, and after the ZLB?
  - *My answer:* Yes! Objectives are the same. ZLB is constraint on an instrument and not a policy regime change.
- All else equal, do you think that interest rates would rise faster after seven quarters if inflation is above target during the ZLB episode?
  - *My answer:* Yes! Policy rate normalization is faster.

**Implication:** Yes to both means standard Taylor rules are not appropriate summaries of policy



# Modeling Exercise IV

## Standard modeling assumptions

- The standard way to close an NK Model

$$i_t = (1 - \rho_i)\bar{r} + \rho i_{t-1} + (1 - \rho)(\phi_\pi \pi_t + \phi_x x_t), \quad (1)$$

- The standard way to add the ZLB

$$i_t = \max \{ (1 - \rho_i)\bar{r} + \rho i_{t-1} + (1 - \rho)(\phi_\pi \pi_t + \phi_x x_t), 0 \}. \quad (2)$$



# Modeling Exercise IV

## Standard modeling assumptions

- The standard way to close an NK Model

$$i_t = (1 - \rho_i)\bar{r} + \rho i_{t-1} + (1 - \rho)(\phi_\pi \pi_t + \phi_x x_t), \quad (3)$$

- The standard way to add the ZLB

$$i_t = \max \{ (1 - \rho_i)\bar{r} + \rho i_{t-1} + (1 - \rho)(\phi_\pi \pi_t + \phi_x x_t), 0 \}. \quad (4)$$

Policy objectives the same?



# Modeling Exercise IV

## Standard modeling assumptions

- The standard way to close an NK Model

$$i_t = (1 - \rho_i)\bar{r} + \rho i_{t-1} + (1 - \rho)(\phi_\pi \pi_t + \phi_x x_t), \quad (5)$$

- The standard way to add the ZLB

$$i_t = \max \{ (1 - \rho_i)\bar{r} + \rho i_{t-1} + (1 - \rho)(\phi_\pi \pi_t + \phi_x x_t), 0 \}. \quad (6)$$

Policy is history dependent?



# Resolving New Keynesian Puzzles I

**Note the following equivalent representations:**

$$i_t - \rho i_{t-1} = (1 - \rho)\bar{r} + (1 - \rho)(\phi_\pi \pi_t + \phi_x x_t)$$

$$i_t = \bar{r} + (1 - \rho) \sum_{j=0}^t \rho^j (\phi_\pi \pi_{t-j} + \phi_x x_{t-j})$$

$$\begin{aligned} i_t &= \bar{r} + \phi_\pi \omega_t^\pi + \phi_x \omega_t^y \\ \omega_t^\pi &= \omega_{t-1}^\pi + (1 - \rho)(\pi_t - \omega_{t-1}^\pi) \\ \omega_t^x &= \omega_{t-1}^x + (1 - \rho)(x_t - \omega_{t-1}^x) \end{aligned}$$



# Resolving New Keynesian Puzzles II

## History dependence at the ZLB

- At the ZLB the central bank ignores everything that occurred

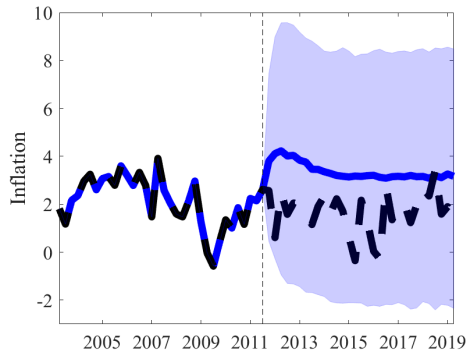
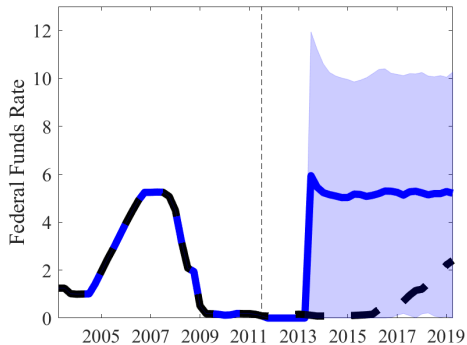
$$i_t = \max \{ (1 - \rho_i)\bar{r} + \rho i_{t-1} + (1 - \rho)(\phi_\pi \pi_t + \phi_x x_t), 0 \}$$

- Central bank and private sector can keep track of objectives even when  $i_t = 0$

$$\begin{aligned} i_t &= \max \{ \bar{r} + \phi_\pi \omega_t^\pi + \phi_x \omega_t^x, 0 \} \\ \omega_t^\pi &= \omega_{t-1}^\pi + (1 - \rho)(\pi_t - \omega_{t-1}^\pi) \\ \omega_t^x &= \omega_{t-1}^x + (1 - \rho)(x_t - \omega_{t-1}^x) \end{aligned}$$



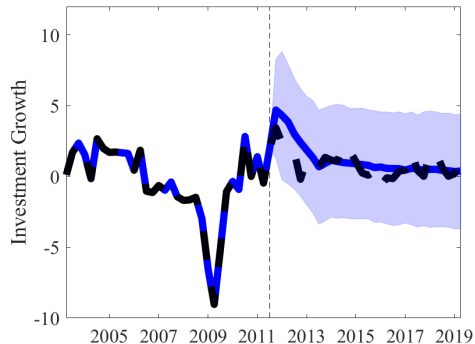
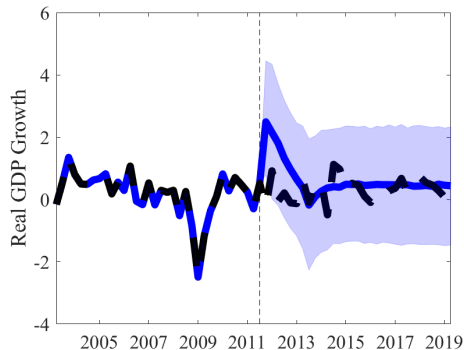
# Resolving New Keynesian Puzzles III



**Figure:** Smets and Wouters (2007) posterior estimates with data ending in 2004



# Resolving New Keynesian Puzzles III



**Figure:** Smets and Wouters (2007) posterior estimates with data ending in 2004



# What's wrong with a Taylor rule?

**Svensson (JEL 2003) pg. 429 - 420**

*“Monetary policy by the world’s more advanced central banks these days is at least as optimizing and forward-looking as the behavior of the most rational private agents. I find it strange that a large part of the literature on monetary policy still prefers to represent central bank behavior with the help of mechanical instrument rules.”*

**Implication:** Study target criteria instead...



# Optimal monetary policy I

**Solve for optimal commitment from the timeless perspective:**

$$\min \left\{ -\frac{1}{2} \mathbb{E}_t \sum_{T=t}^{\infty} (\pi_T^2 + \alpha x_T^2) \right\}$$

Subject to

$$\begin{aligned} x_t &= \mathbb{E}_t x_{t+1} - \frac{1}{\sigma} (i_t - \mathbb{E}_t \pi_{t+1} - r_t^n) \\ \pi_t &= \beta \mathbb{E}_t \pi_{t+1} + \kappa x_t + \mu_t \end{aligned}$$

- Unconditional commitment (Blake, 2001; Jensen and McCallum, 2002)

$$x_t - \beta x_{t-1} = -\frac{\kappa}{\alpha} \pi_t$$



## Optimal monetary policy II

Unconditional target criterion:  $x_t = -\frac{\kappa}{\alpha} \frac{\pi_t}{1 - \beta L}$ .

### Proposition

*The optimal target criterion may be implemented by either of the following interest rate rules*

$$\text{Optimal Rule 1 : } i_t = \beta i_{t-1} + \frac{\kappa}{\sigma \alpha} \pi_t + (1 - \beta L) \left( \frac{1}{\sigma} E_t y_{t+1} + E_t \pi_{t+1} + r_t^n \right) \quad (7)$$

$$\begin{aligned} \text{Optimal Rule 2 : } \quad i_t &= \frac{\kappa}{\sigma \alpha (1 - \beta)} \omega_t^\pi + \frac{1}{\sigma} E_t y_{t+1} + E_t \pi_{t+1} + r_t^n \\ \omega_t^\pi &= \omega_{t-1}^\pi + (1 - \beta)(\pi_t - \omega_{t-1}^\pi) \end{aligned} \quad (8)$$



## Optimal monetary policy II

Unconditional target criterion:  $x_t = -\frac{\kappa}{\alpha} \frac{\pi_t}{1 - \beta L}$ .

### Proposition

*The optimal target criterion may be implemented by either of the following interest rate rules*

$$\text{Optimal Rule 1 :} \quad i_t = \beta i_{t-1} + \frac{\kappa}{\sigma \alpha} \pi_t + (1 - \beta L) \left( \frac{1}{\sigma} E_t y_{t+1} + E_t \pi_{t+1} + r_t^n \right) \quad (9)$$

$$\begin{aligned} \text{Optimal Rule 2 :} \quad i_t &= \frac{\kappa}{\sigma \alpha (1 - \beta)} \omega_t^\pi + \frac{1}{\sigma} E_t y_{t+1} + E_t \pi_{t+1} + r_t^n \\ \omega_t^\pi &= \omega_{t-1}^\pi + (1 - \beta)(\pi_t - \omega_{t-1}^\pi) \end{aligned} \quad (10)$$



## Optimal monetary policy II

$$\text{Unconditional target criterion: } x_t = -\frac{\kappa}{\alpha} \frac{\pi_t}{1 - \beta L}.$$

### Proposition

*The optimal target criterion may be implemented by either of the following interest rate rules*

$$\text{Optimal Rule 1 : } i_t = \beta i_{t-1} + \frac{\kappa}{\sigma\alpha} \pi_t + (1 - \beta L) \left( \frac{1}{\sigma} E_t y_{t+1} + E_t \pi_{t+1} + r_t^n \right) \quad (9)$$

$$\begin{aligned} \text{Optimal Rule 2 : } i_t &= \frac{\kappa}{\sigma\alpha(1-\beta)} \omega_t^\pi + \frac{1}{\sigma} E_t y_{t+1} + E_t \pi_{t+1} + r_t^n \\ \omega_t^\pi &= \omega_{t-1}^\pi + (1 - \beta)(\pi_t - \omega_{t-1}^\pi) \end{aligned} \quad (10)$$

**Implication:** We can approximate optimal policy in the absence of the ZLB with an inertial rule or a weighted average inflation rule.



## Optimal monetary policy II

$$\text{Unconditional target criterion: } x_t = -\frac{\kappa}{\alpha} \frac{\pi_t}{1 - \beta L}.$$

### Proposition

*The optimal target criterion may be implemented by either of the following interest rate rules*

$$\text{Optimal Rule 1 : } i_t = \beta i_{t-1} + \frac{\kappa}{\sigma \alpha} \pi_t + (1 - \beta L) \left( \frac{1}{\sigma} E_t y_{t+1} + E_t \pi_{t+1} + r_t^n \right) \quad (11)$$

$$\begin{aligned} \text{Optimal Rule 2 : } i_t &= \frac{\kappa}{\sigma \alpha (1 - \beta)} \omega_t^\pi + \frac{1}{\sigma} E_t y_{t+1} + E_t \pi_{t+1} + r_t^n \\ \omega_t^\pi &= \omega_{t-1}^\pi + (1 - \beta)(\pi_t - \omega_{t-1}^\pi) \end{aligned} \quad (12)$$

**Implication:** A weighted average inflation rule better approximates optimal policy with demand shocks



# Flexible Average Inflation Targeting

## Resolving puzzles:

- Weighted average rules with appropriate forward guidance approximate optimal commitment policy with ZLB constraint [▶ Here](#)
  - Optimal commitment policy of Eggertsson and Woodford (2003) is puzzle free!  
⇒ **forward guidance still too powerful!**
- Weighted average rules resolve quantitative aspects of the other puzzle (flexibility, fiscal multiplier, and toil) [▶ Here](#)
- To resolve all New Keynesian puzzles monetary policy must promise to more than make up for past misses (consistent with optimal commitment) [▶ Here](#)
- We don't need bounded rationality, incomplete markets, imperfect credibility, the fiscal theory, or any other fix for New Keynesian puzzles



# Conclusion

- Provide an explanation and resolution of the New Keynesian ZLB puzzles (forward guidance, paradox of flexibility, paradox of toil, ect.)
- Explanation and resolution does not rely on
  - Bounded rationality or myopia
  - Incomplete markets or HANK considerations
  - Imperfect credibility
  - Any change whatsoever to micro-foundations of the NK model
- Demonstrate that study of **target criteria** reveals both the explanation and the resolution
- Four keys to the results:
  1. Explicitly specifying **monetary policy objectives in expectation** is the source of the puzzle
  2. Explicitly specifying that **monetary policy objectives remain the same** before, during, and after the ZLB resolves the puzzles
  3. **FAIT** can explicitly convey monetary policy objectives before, during and after ZLB episodes
  4. Even in the absence of NK puzzles policy is still too powerful



# FAIT and optimal policy I

**Solve for optimal commitment from the timeless perspective:**

$$\min \left\{ -\frac{1}{2} \mathbb{E}_t \sum_{T=t}^{\infty} \beta^{T-t} (\pi_t^2 + \alpha x_t^2) \right\}$$

Subject to

$$x_t = \mathbb{E}_t x_{t+1} - \frac{1}{\sigma} (i_t - \mathbb{E}_t \pi_{t+1} - r_t^n)$$

$$\pi_t = \beta \mathbb{E}_t \pi_{t+1} + \kappa x_t$$

$$i_t \geq 0$$



# FAIT and optimal policy II

## Eggertsson and Woodford (2003)

**Before the shock:** REE equilibrium with  $x_t = \pi_t = 0, i_t = r_t^n = r_H$

**The shock:** Unexpectedly switch to  $r_t^n = r_L < 0$

- Two-state Markov structure

$$D = \begin{pmatrix} 1 - \delta & \delta \\ 0 & 1 \end{pmatrix}$$

- Low state (L) persists with prob.  $1 - \delta$ ; high state (H) absorbing
- In the low state  $i_t = 0$  always: ZLB constraint



# FAIT and optimal policy III

## Optimal policy

- The realized period of the shock is indexed by  $\tau$
- For each  $\tau$  the central bank promises  $k_\tau$  periods of forward guidance
- Forward guidance policy:

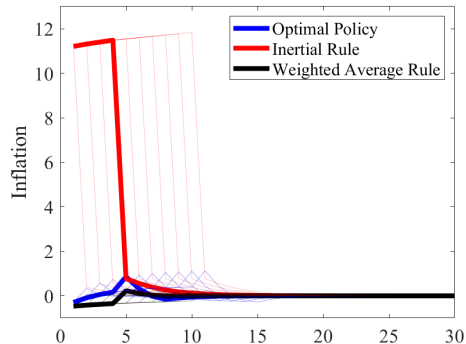
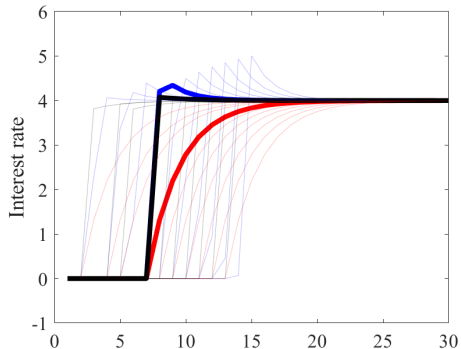
$$k_\tau = \{0, 1, 2, 2, 2, 3, 3, 4, \dots\}$$

- Duration of the ZLB for any realization of uncertainty

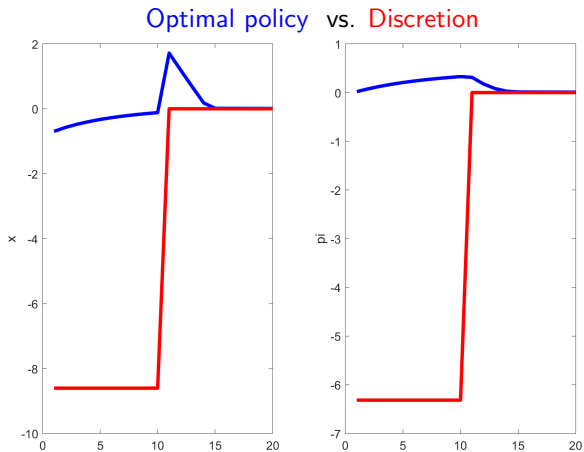
$$T_{zlb} = \tau + k_\tau$$



# FAIT and optimal policy IV



# FAIT and optimal policy V



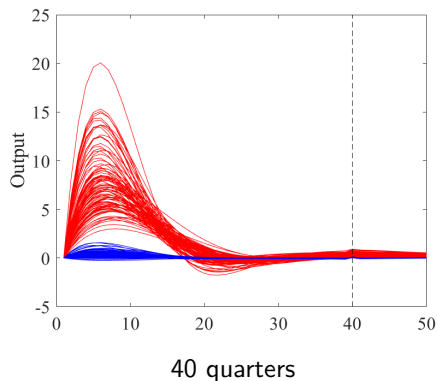
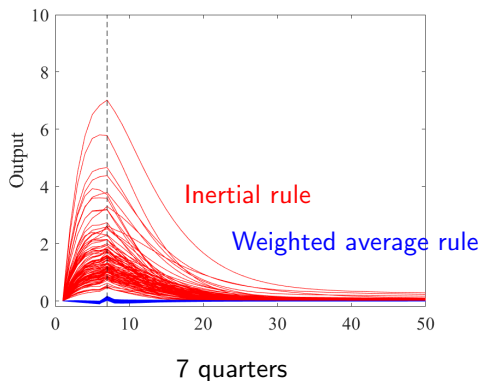
Policy is still too powerful!

► Back



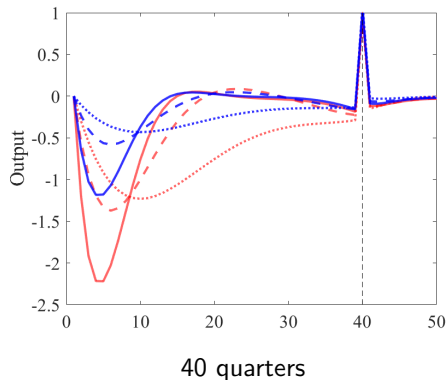
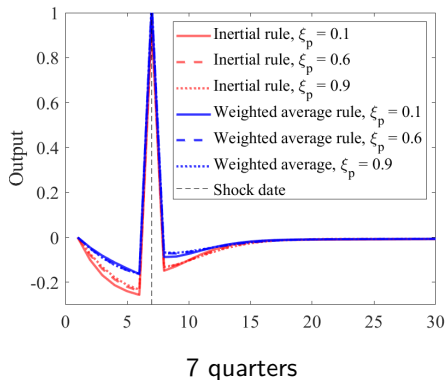
## Other puzzles I

Paradox of toil: anticipated negative productivity shock



## Other puzzles II

Fiscal multiplier puzzle and paradox of flexibility: anticipated gov. spending shock



► Back



# Resolving limit puzzles I

Study anticipated interest rate, government spending, and productivity shocks:

$$y_t = E_t y_{t+1} - \sigma^{-1} (i_t - E_t \pi_{t+1} - r_t^n) + g_t - E_t g_{t+1} \quad (13)$$

$$\pi_t = \beta E_t \pi_{t+1} + \kappa (y_t - \delta_g g_t - a_t). \quad (14)$$

$$i_t = \begin{cases} \bar{i}_t + \phi \pi_t & \text{for } t = T, T+1, \dots, T^* \\ \bar{i}_t + \phi^* \omega_t & \text{for } t > T^*, \end{cases} \quad (15)$$

$$\omega_t = \begin{cases} \rho \omega_{t-1} + \pi_t & \text{for } t = T, T+1, \dots, T^* \\ \rho^* \omega_{t-1} + \pi_t & \text{for } t > T^*. \end{cases} \quad (16)$$



## Resolving limit puzzles II

**Definition 1 (forward guidance puzzle)** *When the policy rate is expected to be set passively during the next  $\Delta_p > 0$  periods, the response of current inflation and output to an expected policy-rate shock  $\Delta_p$  periods ahead,  $\bar{i}_{t+\Delta_p}$ , goes to plus or minus infinity with  $\Delta_p$ , i.e.,*

$$\lim_{\Delta_p \rightarrow +\infty} |\partial z_T / \partial \bar{i}_{T+\Delta_p}| = \infty \text{ where } z \in \{\pi, y\}.$$



## Resolving limit puzzles II

**Definition 1 (forward guidance puzzle)** *When the policy rate is expected to be set passively during the next  $\Delta_p > 0$  periods, the response of current inflation and output to an expected policy-rate shock  $\Delta_p$  periods ahead,  $\bar{i}_{t+\Delta_p}$ , goes to plus or minus infinity with  $\Delta_p$ , i.e.,*

$$\lim_{\Delta_p \rightarrow +\infty} |\partial z_T / \partial \bar{i}_{T+\Delta_p}| = \infty \text{ where } z \in \{\pi, y\}.$$

### Proposition (Forward Guidance Puzzle)

*The NK model with monetary policy given by equations (13), (14), (15), and (16) with  $\phi^* > 1$ ,  $0 \leq \phi < 1$ , and  $0 < \rho^* < 1$  exhibits the forward guidance puzzle if  $\rho < 1$ . The forward guidance puzzle is resolved if  $\rho > 1$ .*



# Resolving limit puzzles III

## Corollary (Resolution of the Quantitative Puzzles)

When  $0 < \rho < 1$  and  $\Delta_p > 0$ ,

$$\frac{\partial}{\partial \rho} \left( \left| \frac{\partial z_T}{\partial \bar{i}_{T+\Delta_p}} \right| \right) < 0.$$

- This explains why puzzles mitigated in estimated model



## Resolving limit puzzles IV

**Definition 2 (fiscal multiplier puzzle)** *When the policy rate is expected to be set passively during the next  $\Delta_p > 0$  periods, the response of current inflation and output to an expected expansionary government spending shock  $\Delta_p$  periods ahead,  $g_{T+\Delta_p} > 0$ , goes to plus or minus infinity with  $\Delta_p$ , i.e.,*

$$\lim_{\Delta_p \rightarrow +\infty} |\partial z_T / \partial g_{T+\Delta_p}| = \infty \text{ where } z \in \{\pi, y\}.$$



## Resolving limit puzzles IV

**Definition 2 (fiscal multiplier puzzle)** *When the policy rate is expected to be set passively during the next  $\Delta_p > 0$  periods, the response of current inflation and output to an expected expansionary government spending shock  $\Delta_p$  periods ahead,  $g_{T+\Delta_p} > 0$ , goes to plus or minus infinity with  $\Delta_p$ , i.e.,*

$$\lim_{\Delta_p \rightarrow +\infty} |\partial z_T / \partial g_{T+\Delta_p}| = \infty \text{ where } z \in \{\pi, y\}.$$

### Proposition (Fiscal Multiplier Puzzle)

*The NK model with monetary policy given by equations (13), (14), (15), and (16) with  $\phi^* > 1$ ,  $0 \leq \phi < 1$ ,  $0 < \rho^* < 1$ , and  $\rho \neq \bar{\rho} < 1$  exhibits the fiscal multiplier puzzle if  $\rho < 1$ . The fiscal multiplier puzzle is resolved if  $\rho > 1$ .*



## Resolving limit puzzles V

**Definition 3 (paradox of toil)** *When the policy rate is expected to be set passively during the next  $\Delta_p > 0$  periods, the response of current output to a positive supply shock  $\Delta_p$  periods ahead,  $a_{T+\Delta_p} > 0$ , is weakly contractionary with  $\Delta_p$ , i.e.,*

$$\partial y_T / \partial a_{T+\Delta_p} \leq 0.$$



## Resolving limit puzzles V

**Definition 3 (paradox of toil)** *When the policy rate is expected to be set passively during the next  $\Delta_p > 0$  periods, the response of current output to a positive supply shock  $\Delta_p$  periods ahead,  $a_{T+\Delta_p} > 0$ , is weakly contractionary with  $\Delta_p$ , i.e.,*

$$\partial y_T / \partial a_{T+\Delta_p} \leq 0.$$

### Proposition (The Paradox of Toil)

*The NK model with monetary policy given by equations (13), (14), (15), and (16) with  $\phi^* > 1$ ,  $0 \leq \phi < 1$ , and  $0 < \rho^* < 1$  has the property that there exists a  $\tilde{\rho}$  such that if  $\rho < \tilde{\rho}$ , then equilibrium exhibits the paradox of toil, and if  $\rho > \tilde{\rho}$ , the paradox of toil is resolved.*



## Resolving limit puzzles VI

**Definition 4 (paradox of flexibility)** *When the policy rate is expected to be set passively during the next  $\Delta_p > 0$  periods, the response of current inflation and output to an expected shock  $\Delta_p$  periods ahead goes to plus or minus infinity as  $\kappa$  goes to infinity, i.e.,*

$$\lim_{\kappa \rightarrow +\infty} |\partial z_T / \partial v_{T+\Delta_p}| = \infty \text{ where } z \in \{\pi, y\} \text{ and } v = \{i^*, g, a\}.$$



## Resolving limit puzzles VI

**Definition 4 (paradox of flexibility)** *When the policy rate is expected to be set passively during the next  $\Delta_p > 0$  periods, the response of current inflation and output to an expected shock  $\Delta_p$  periods ahead goes to plus or minus infinity as  $\kappa$  goes to infinity, i.e.,*

$$\lim_{\kappa \rightarrow +\infty} |\partial z_T / \partial v_{T+\Delta_p}| = \infty \text{ where } z \in \{\pi, y\} \text{ and } v = \{i^*, g, a\}.$$

### Proposition (Paradox of Flexibility)

*The NK model with monetary policy given by equations (13), (14), (15), and (16) with  $\phi^* > 1$ ,  $0 \leq \phi < 1$ , and  $0 < \rho^* < 1$  does not exhibit the paradox of flexibility if  $\rho > 0$ .*

► Back

