Discussion of "The Limitations of Forward Guidance" by Gavin et al.

Marco Del Negro

Federal Reserve Bank of New York

ECB Conference on "Non-standard monetary policy measures", October 2014

Disclaimer: **The views expressed are mine and do NOT necessarily reflect those of the Federal Reserve Bank of New York or the Federal Reserve System**

Outline

1. Forward Guidance 101: The effects in a linear DSGE
   - This paper assesses the effects of forward guidance using a **fully non-linear stochastic** model .. but let's build some intuition using a linear model

2. Forward guidance in an estimated DSGE model
   - Impulse response functions
   - A policy experiment: The effects of the Sept 2012 statement
   - The "forward guidance puzzle"

3. Are non-linearities the solution to the puzzle?

Forward Guidance 101: The effects in a linear DSGE

- Take a 3-equations NK model
- Modify the policy rule so to introduce forward guidance via anticipated policy shocks (Laseen & Svensson 2009):

$$\hat{R}_t = \psi_\pi \hat{\pi}_t + \epsilon^R_t + \sum_{k=1}^{K} \epsilon^R_{k,t-k}$$

  where $\epsilon^R_{k,t-k}$ = is "news" about future policy – that is, a shock that is known to agents at time $t-k$, but affects the policy rule k periods later, that is, at time t.

- Are these policy news shocks more or less powerful than contemporaneous (usual) policy shocks?

Forward Guidance 101: The effects in a linear DSGE

Step 1: Consumption depends on the (real) long rate:

From the Euler eq. $\hat{c}_t = -\boldsymbol{E}_t[\hat{R}_t - \hat{\pi}_{t+1} + \hat{c}_{t+1}] \longrightarrow$

$$\hat{c}_t = -\underbrace{\sum_{j=0}^{\infty} \boldsymbol{E}_t[\hat{R}_{t+j} - \hat{\pi}_{t+1+j}]}_{\widehat{LR}_t}$$

Step 2: Anticipated shocks move consumption tomorrow and today $\longrightarrow$ stronger effect on inflation:

- (Assume for now the price level is fixed $\rightarrow$ the Fed pegs the real rate)
- Contemporaneous shock: $\hat{R}_t = -\Delta,\ \hat{R}_{t+1} = 0,\ \hat{R}_{t+2} = 0... \longrightarrow$ $\widehat{LR}_t = -\Delta,\ \widehat{LR}_{t+1} = 0, ... \longrightarrow \hat{c}_t = \Delta,\ \hat{c}_{t+1} = 0, ...$
- Anticipated shock: $\hat{R}_t = 0,\ \hat{R}_{t+1} = -\Delta,\ \hat{R}_{t+2} = 0... \longrightarrow$ $\widehat{\mathbf{LR}}_\mathbf{t} = -\boldsymbol{\Delta},\ \widehat{LR}_{t+1} = -\Delta, ... \longrightarrow \hat{\mathbf{c}}_\mathbf{t} = \boldsymbol{\Delta},\ \hat{c}_{t+1} = \Delta,\ \hat{c}_{t+2} = 0, ...$

Forward Guidance 101: The effects in a linear DSGE

Step 1: Consumption depends on the (real) long rate:

From the Euler eq. $\hat{c}_t = -\boldsymbol{E}_t[\hat{R}_t - \hat{\pi}_{t+1} + \hat{c}_{t+1}] \longrightarrow$

$$\hat{c}_t = -\underbrace{\sum_{j=0}^{\infty} \boldsymbol{E}_t[\hat{R}_{t+j} - \hat{\pi}_{t+1+j}]}_{\widehat{LR}_t}$$

Step 2: Anticipated shocks move consumption tomorrow and today $\longrightarrow$ stronger effect on inflation:

- (Assume for now the price level is fixed $\rightarrow$ the Fed pegs the real rate)
- Contemporaneous shock: $\hat{R}_t = -\Delta,\ \hat{R}_{t+1} = 0,\ \hat{R}_{t+2} = 0... \longrightarrow$ $\widehat{LR}_t = -\Delta,\ \widehat{LR}_{t+1} = 0, ... \longrightarrow \hat{c}_t = \Delta,\ \hat{c}_{t+1} = 0, ...$
- Anticipated shock: $\hat{R}_t = 0,\ \hat{R}_{t+1} = -\Delta,\ \hat{R}_{t+2} = 0... \longrightarrow$ $\widehat{LR}_t = -\Delta,\ \widehat{LR}_{t+1} = -\Delta, ... \longrightarrow \hat{c}_t = \Delta,\ \hat{c}_{t+1} = \Delta,\ \hat{c}_{t+2} = 0, ...$

Forward Guidance 101: The effects in a linear DSGE

Step 1: Consumption depends on the (real) long rate:

From the Euler eq. $\hat{c}_t = -\boldsymbol{E}_t[\hat{R}_t - \hat{\pi}_{t+1} + \hat{c}_{t+1}] \longrightarrow$

$$\hat{c}_t = -\underbrace{\sum_{j=0}^{\infty} \boldsymbol{E}_t[\hat{R}_{t+j} - \hat{\pi}_{t+1+j}]}_{\widehat{LR}_t}$$

Step 2: Anticipated shocks move consumption tomorrow and today $\longrightarrow$ stronger effect on inflation:

- (Assume for now the price level is fixed $\rightarrow$ the Fed pegs the real rate)
- Contemporaneous shock: $\hat{R}_t = -\Delta,\ \hat{R}_{t+1} = 0,\ \hat{R}_{t+2} = 0... \longrightarrow$ $\widehat{LR}_t = -\Delta,\ \widehat{LR}_{t+1} = 0, ... \longrightarrow \hat{c}_t = \Delta,\ \hat{c}_{t+1} = 0, ...$
- Anticipated shock: $\hat{R}_t = 0,\ \hat{R}_{t+1} = -\Delta,\ \hat{R}_{t+2} = 0... \longrightarrow$ $\widehat{\mathbf{LR}}_\mathbf{t} = -\boldsymbol{\Delta},\ \widehat{LR}_{t+1} = -\Delta, ... \longrightarrow \hat{\mathbf{c}}_\mathbf{t} = \boldsymbol{\Delta},\ \hat{c}_{t+1} = \Delta,\ \hat{c}_{t+2} = 0, ...$

Step 3: Now let π move. In the NK model inflation is the PDV of future expected output gaps

$$\hat{\pi}_t = \kappa \sum_{j=0}^{\infty} \beta^j \boldsymbol{E}_t[\hat{c}_{t+j}]$$

- Anticipated shock: more prolonged output increase $\hat{c}_t = \hat{c}_{t+1} = \Delta$ $\longrightarrow$ $\hat{\pi}_t$ rises more $\longrightarrow$ *real* rate drops today.
- However, as $\hat{\pi}_t$ increases, $\hat{R}_t$ also increases and this mitigates the effect of the shock

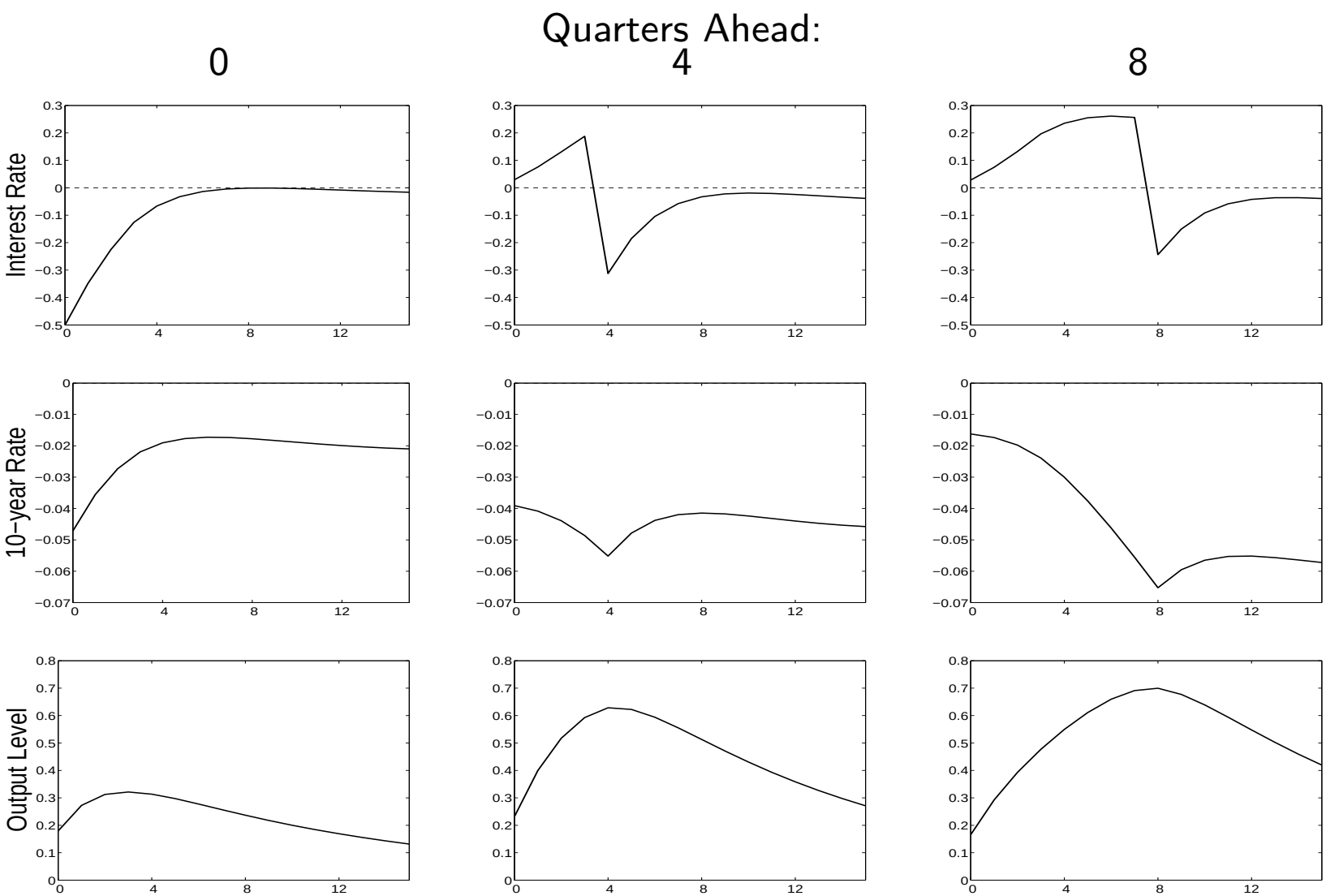
Step 3: Now let π move. In the NK model inflation is the PDV of future expected output gaps

$$\hat{\pi}_t = \kappa \sum_{j=0}^{\infty} \beta^j \boldsymbol{E}_t[\hat{c}_{t+j}]$$

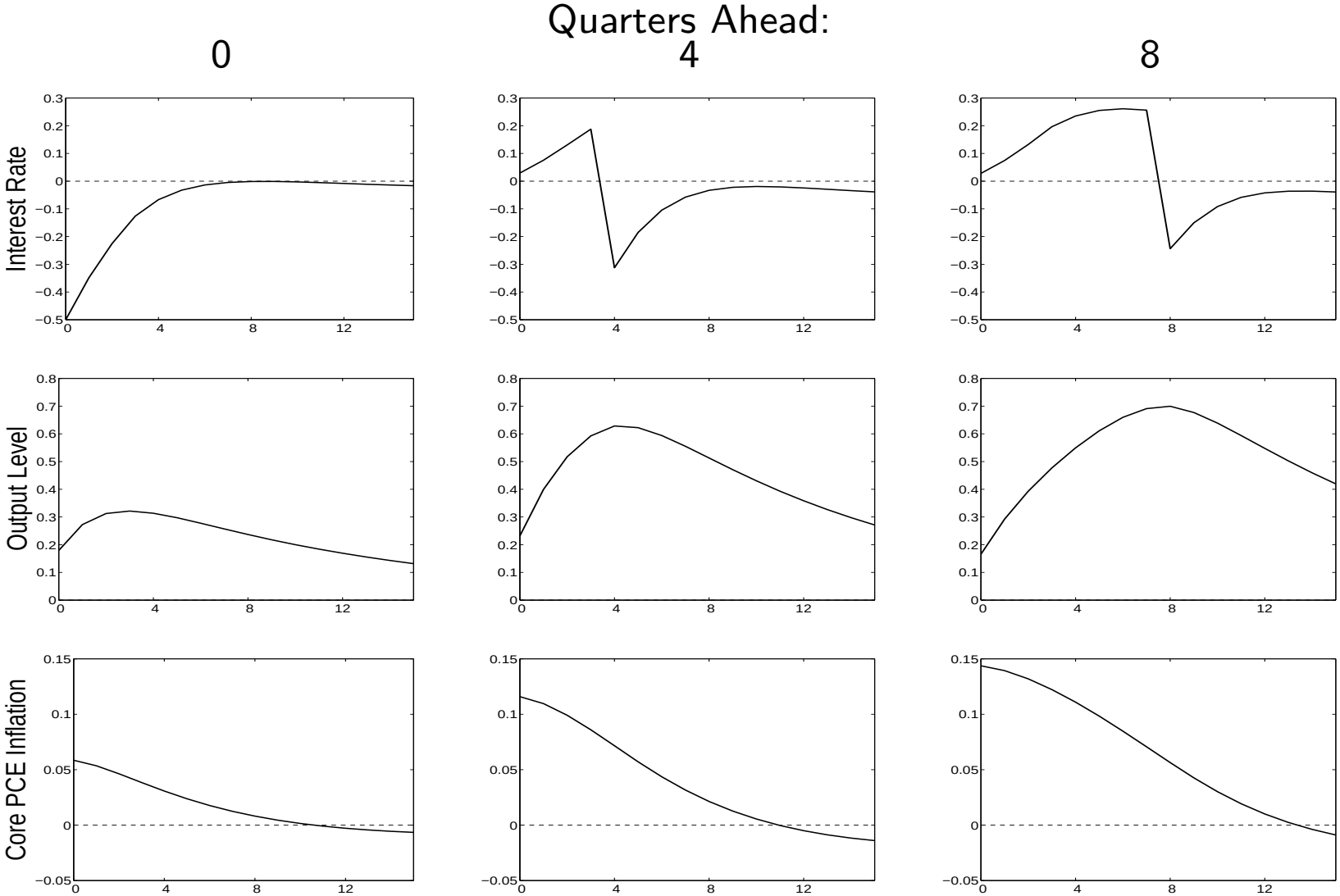
- Anticipated shock: more prolonged output increase $\hat{c}_t = \hat{c}_{t+1} = \Delta$ $\longrightarrow$ $\hat{\pi}_t$ rises more $\longrightarrow$ *real* rate drops today.

- However, as $\hat{\pi}_t$ increases, $\hat{R}_t$ also increases and this mitigates the effect of the shock

Impulse Responses to Anticipated Shocks in an Estimated (FRBNY) DSGE Model

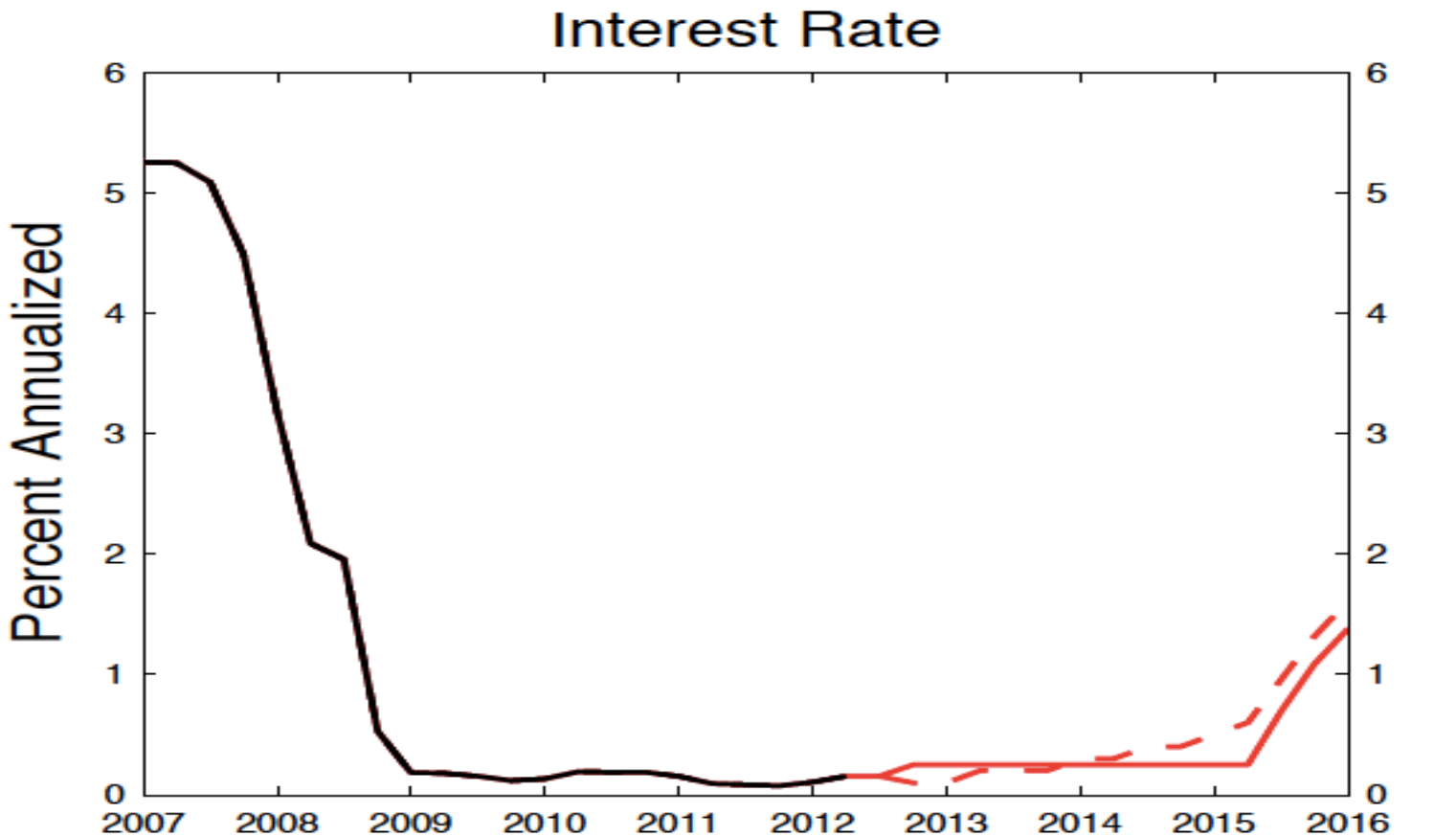


Impulse Responses to Anticipated Shocks in an Estimated (FRBNY) DSGE Model



A Policy Experiment: The Effects of the Sept 2012 Statement

- Imagine the following "counterfactual" experiment. We are at the end of August 2012, and ask ourselves: What if at the September meeting the Fed was to announce that FFR remains at the ZLB through 2015



- **Baseline forecasts (dashed line)**
  - Incorporate pre-FOMC meeting FFR expectations (whether due to Delphic or Odyssean fwd guidance) into the DSGE model – **FFR lifts off in late 2014**.
  - Add Expected FFR ($FFR^e_{t,t+k}$, backed out from OIS rates) to the measurement equations:

$$\begin{aligned} FFR^e_{t,t+k} &= 400\left(\boldsymbol{E}_t\widehat{R}_{t+k} + \ln R_*\right) \\ &= 400\left(\Psi_{R,2}(\hat{\theta})\Phi_1(\hat{\theta})^k s_t + \Psi_{R,1}(\hat{\theta})\right), \quad k = 1, .., K \end{aligned}$$

where

$$s_t = \Phi_1(\hat{\theta})s_{t-1} + \Phi_\epsilon(\hat{\theta})\epsilon_t$$

is the transition equation, and

$$y_t = \Psi_1(\hat{\theta}) + \Psi_2(\hat{\theta})s_t$$

is the measurement equation.

- **Counterfactual forecasts (solid line)**
  - Choose anticipated policy shocks so that post-FOMC

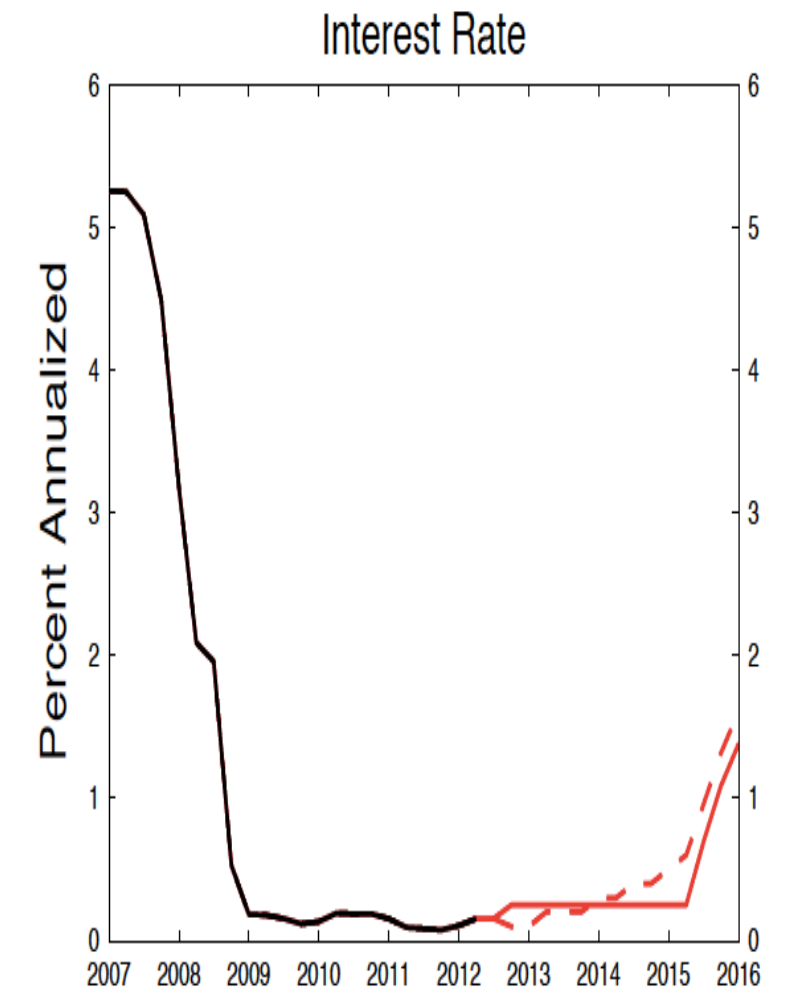
$$FFR^{e}_{t,t+k} = ZLB\ (25\ bp)$$

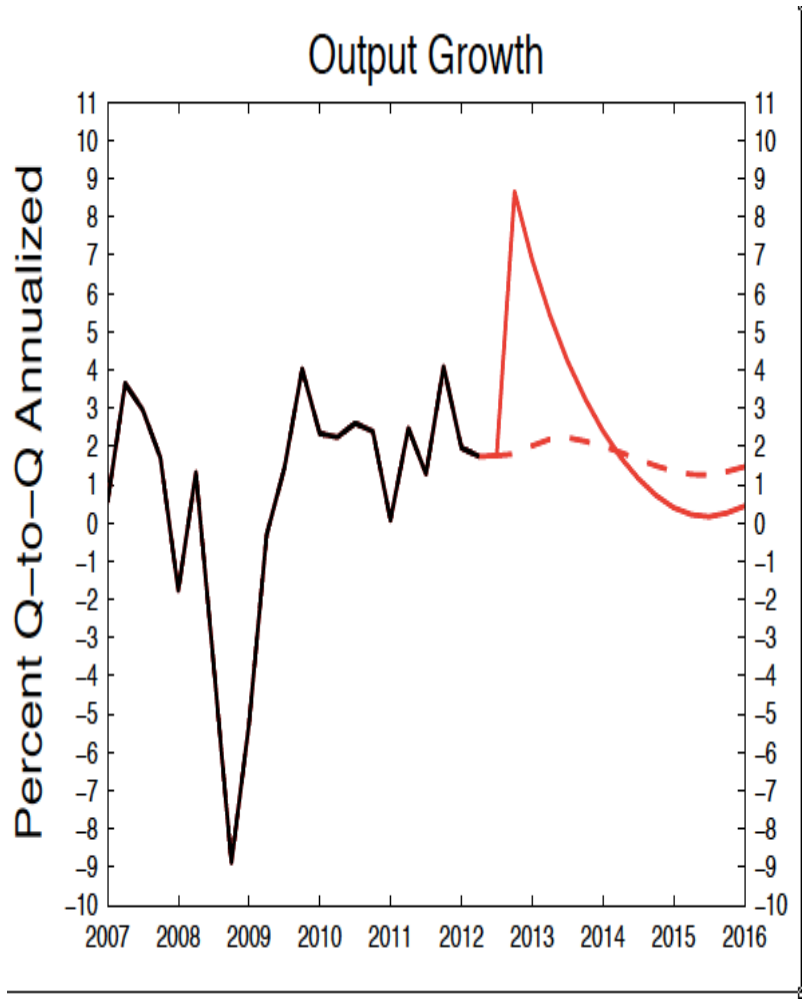
    through 2005Q2.
  - Del Negro and Schorfheide (2013, Handbook of Economic Forecasting chapter)

- That is, assume that the change in FFR expectations following the Sept 2012 FOMC is entirely due to **signaling** (Odyssean fwd guidance)

What is the Outcome of this Experiment?

- The **Forward Guidance Puzzle**
- Excessive response of activity/inflation, also discussed in Carlstrom, Fuerst, and Paustian (2012)





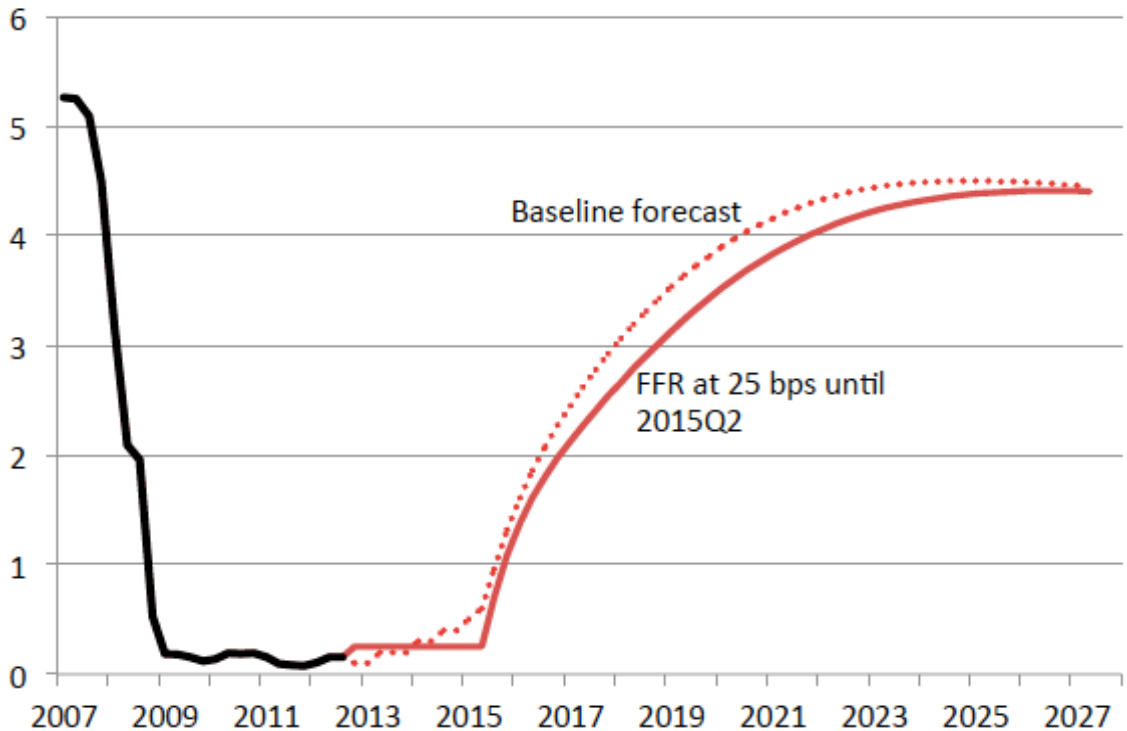
What is the "Excessive" Response Due To?

1. The **NKPC** (Kiley et al. NBER Macroannual 2014, Carlstrom et al.)
2. The **Euler equation**: long-term rate $\longrightarrow$ activity
3. **Excess propagation**: too strong a response of long-term rate to news shocks

- Drop in long term rates. model vs data: 10-year yield: 25 vs 3 bps; 5-year yield: 16 vs 8 bps.

What is the "Excessive" Response Due To?

1. The **NKPC** (Kiley et al. NBER Macroannual 2014, Carlstrom et al.)
2. The **Euler equation**: long-term rate $\longrightarrow$ activity
3. **Excess propagation**: too strong a response of long-term rate to news shocks



- Drop in long term rates. model vs data: 10-year yield: 25 vs 3 bps; 5-year yield: 16 vs 8 bps.

Are Non-Linearities the Solution to the Puzzle?

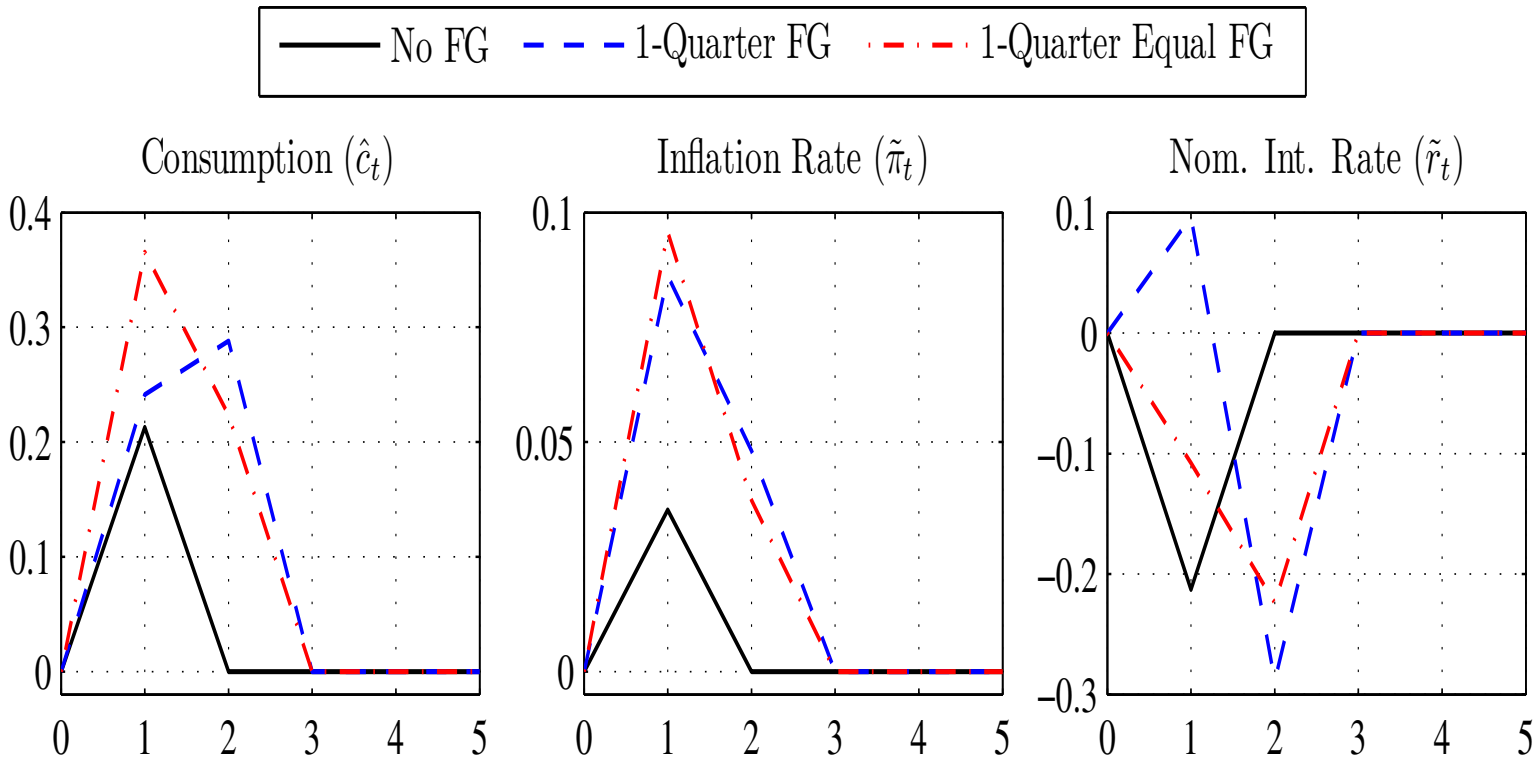
- We would not know from the current draft of the paper
  - My suggestion: Do a policy experiment like the one above and compare outcomes in **linear vs non-linear** solution
  - If linear $\longrightarrow$ puzzle, non-linear $\longrightarrow$ no puzzle, done!
- Model: Non-linear version of the 3-equations NK DSGE model
- I am skeptical that the linear version of this model would produce any forward guidance puzzle: no endogenous state variables, no propagation (Calstrom et al.).

Are Non-Linearities the Solution to the Puzzle?

- We would not know from the current draft of the paper
  - My suggestion: Do a policy experiment like the one above and compare outcomes in **linear vs non-linear** solution
  - If linear $\longrightarrow$ puzzle, non-linear $\longrightarrow$ no puzzle, done!
- Model: Non-linear version of the 3-equations NK DSGE model
- I am skeptical that the linear version of this model would produce any forward guidance puzzle: no endogenous state variables, no propagation (Calstrom et al.).

Results in the paper

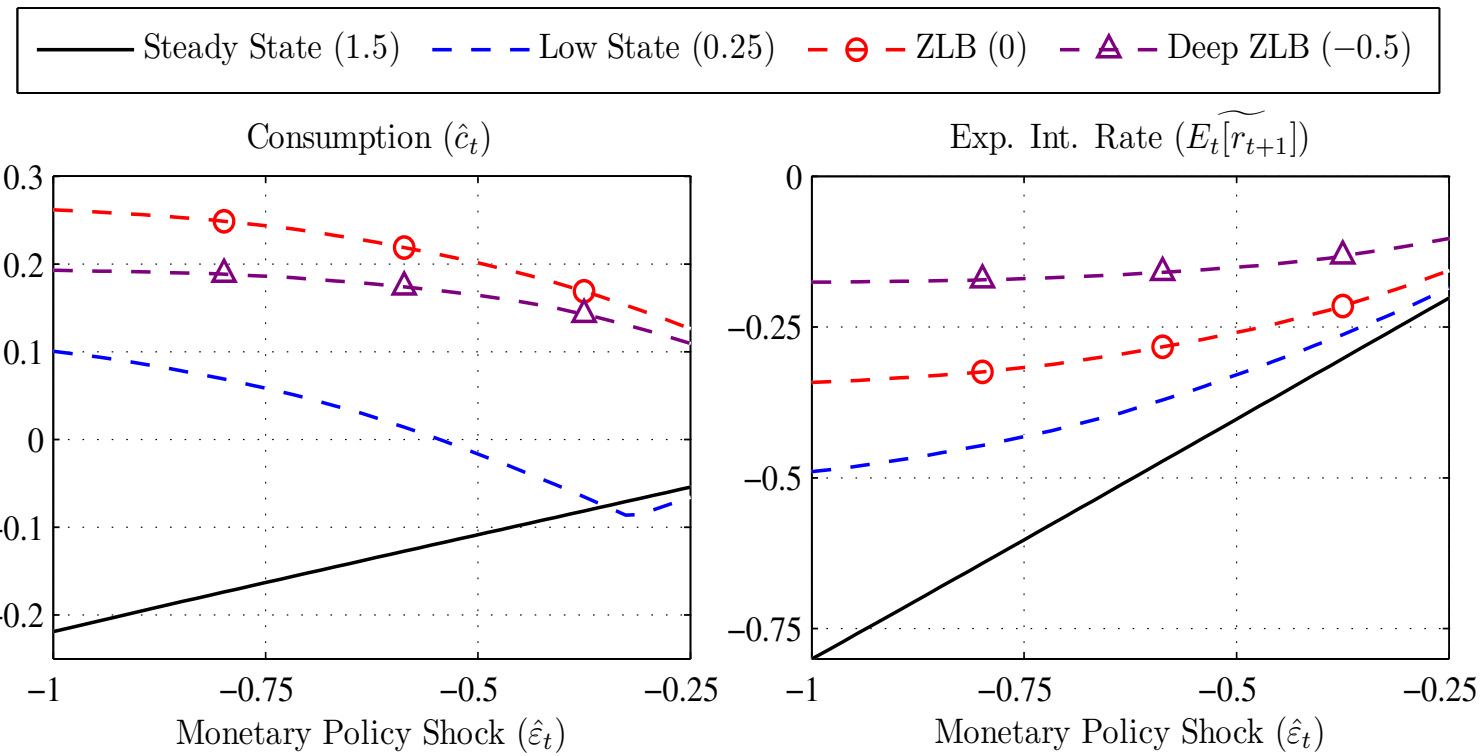
1) "Conventional monetary policy is more stimulative than forward guidance away from the ZLB."



- These non-linear IRFs look familiar to me ... Is the transmission mechanism very different in the linear model?

2) " If the economy is in a deep recession or households expect a slow recovery, then **the stimulative effect of forward guidance is minimal because the short-term nominal interest rate is likely to remain at its ZLB even without forward guidance.**"

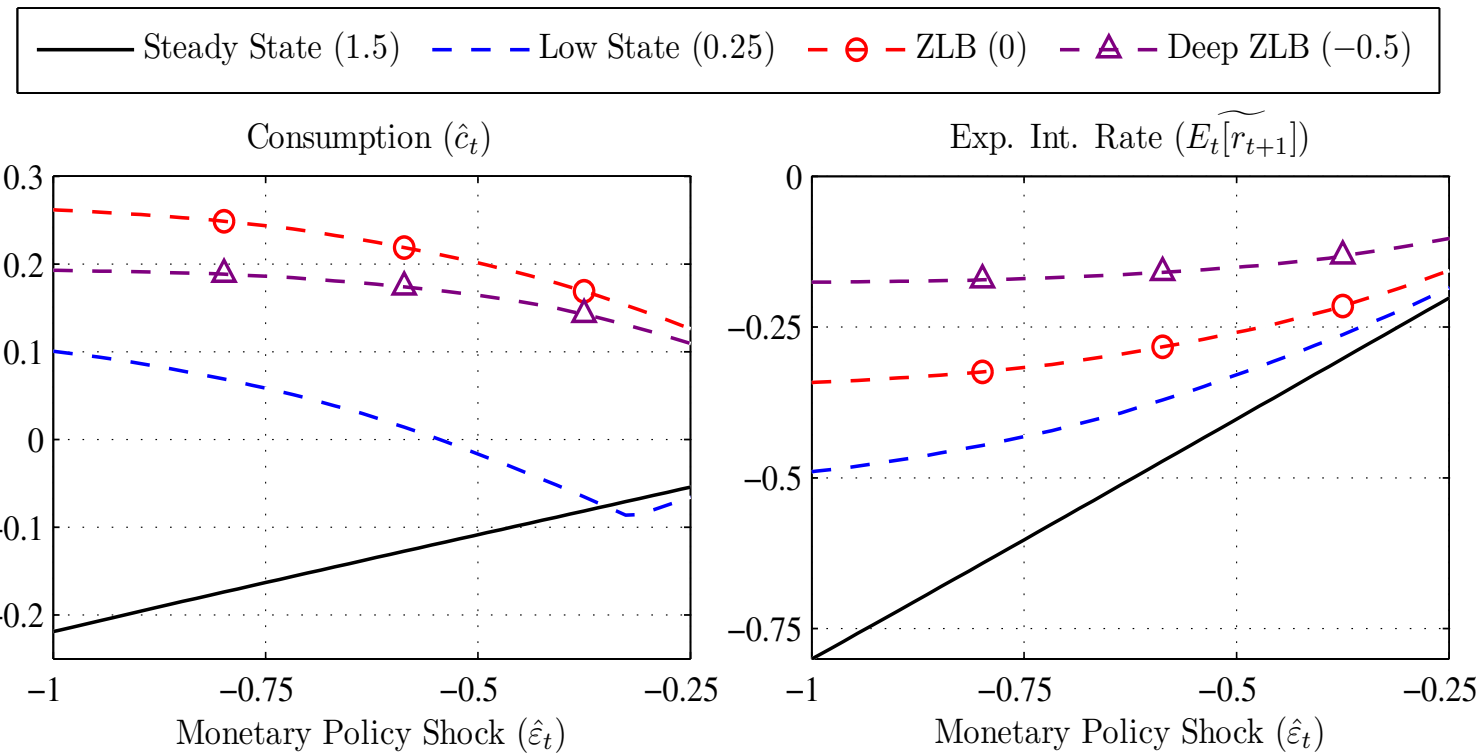
- "Our finding of a limited stimulative effect of forward guidance at the ZLB offers an explanation for the Forward Guidance Puzzle described in Del Negro et al. (2012)"



- Again, wouldn't we get the same result in a linear model, as long as we impose the ZLB?

2) " If the economy is in a deep recession or households expect a slow recovery, then **the stimulative effect of forward guidance is minimal because the short-term nominal interest rate is likely to remain at its ZLB even without forward guidance**."

- "Our finding of a limited stimulative effect of forward guidance at the ZLB offers an explanation for the Forward Guidance Puzzle described in Del Negro et al. (2012)"



- Again, wouldn't we get the same result in a linear model, as long as we impose the ZLB?

Conclusions

- Ambitious paper, but the results do not seem too surprising
    - Although I suspect there is much more in this analysis than currently transpires from the paper.
- In spite of my skepticism, non-linear model are the way to go: **term premia**!