# Forward Guidance and Heterogenous Beliefs

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# How Forward Guidance impacts economic activity?

Our contribution:

1) Survey data : FG led to concensus on expected interest rates, but not on expected activity/inflation;

2) New model with heterogeneous beliefs: FG consistent with consensus on expected interest rates and disagreement on expected activity;

3) Implication: if the proportion of "pessimists" is too high, FG is not optimal.

# Fact 0

## FG lowered expectations about future short-term interest rates

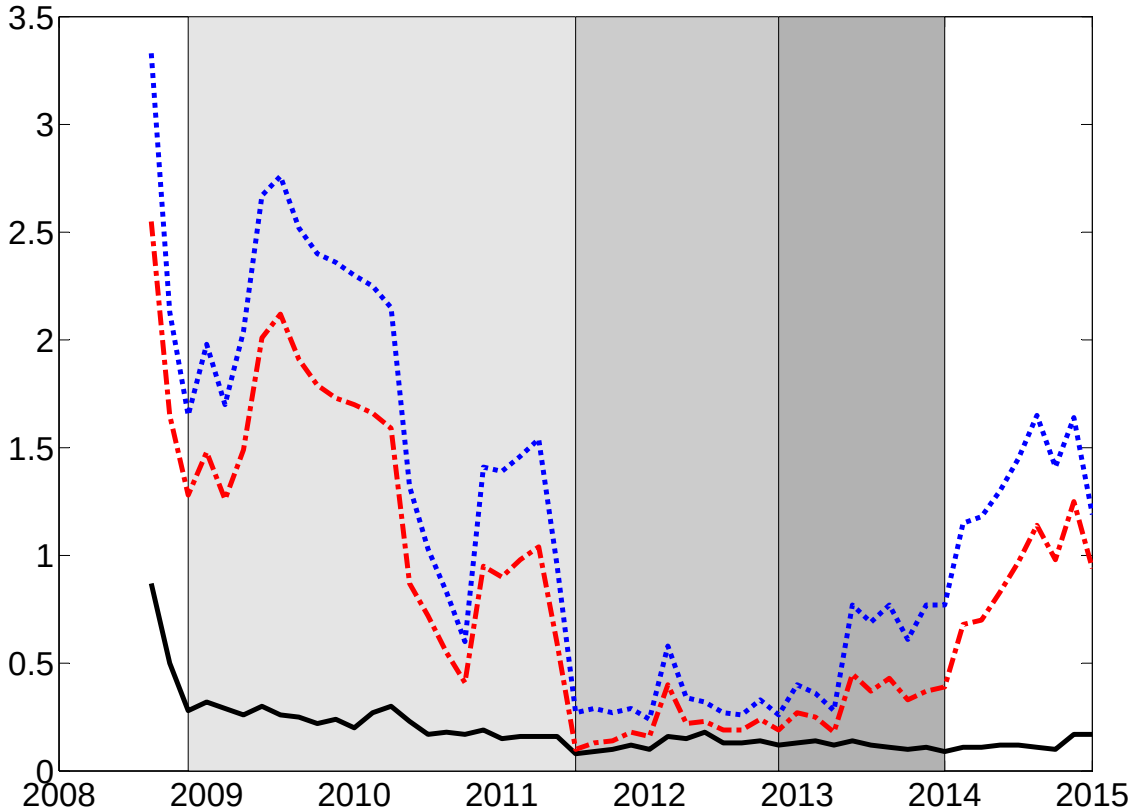



Figure: Expected federal fund rates 1Q (black), 1.5Y (red) and 2Y (blue) ahead. (from OIS, 5-day average after FOMC dates)

# Fact 1

## FG coordinated opinions about future short-term interest rates

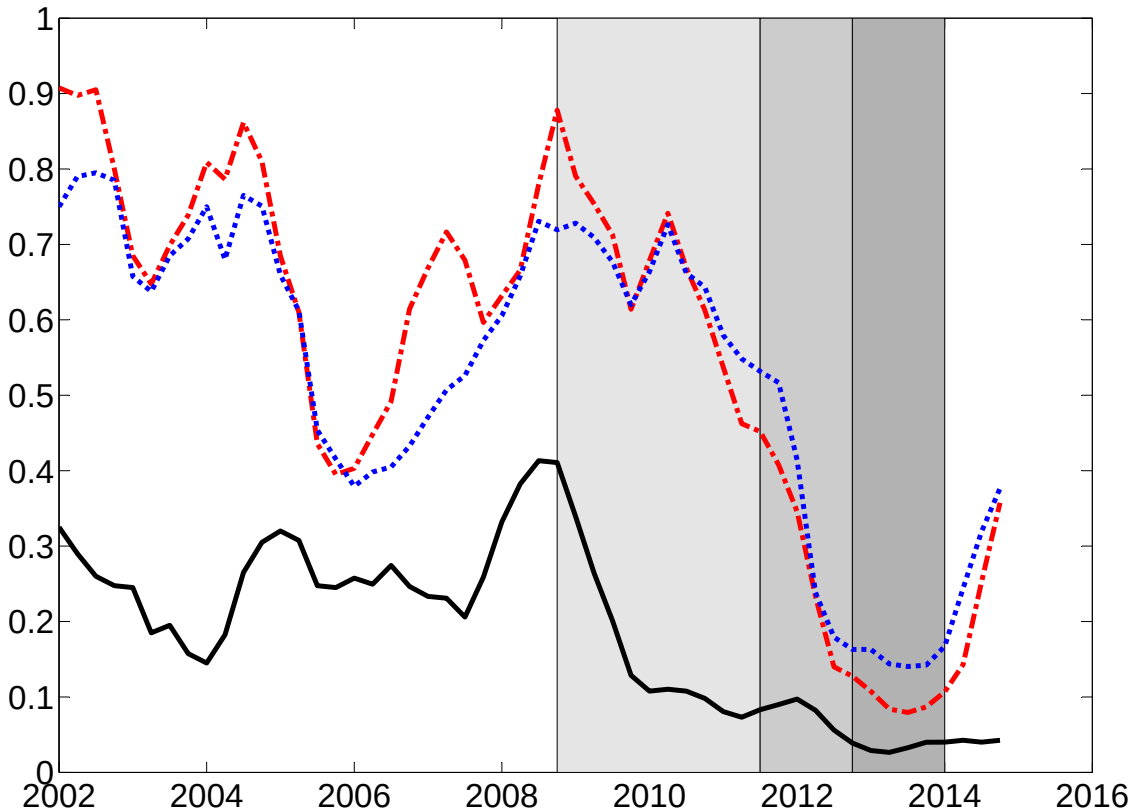
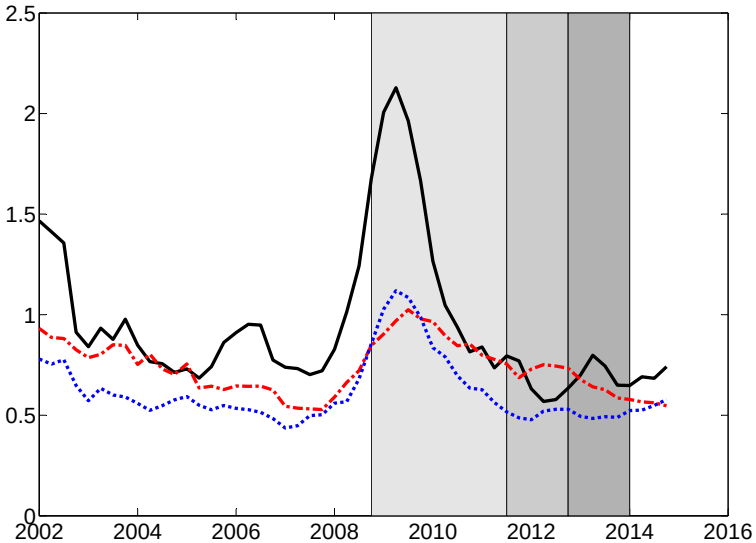



Figure: Disagreement about future 3-month interest rates 1Q (black), 1Y (red) and 2Y (blue) ahead. (Inter-quantile range in US-SPF, 4-quarter average)

# Fact 2

## FG reduced disagreement about future consumption / inflation

Consumption




Inflation

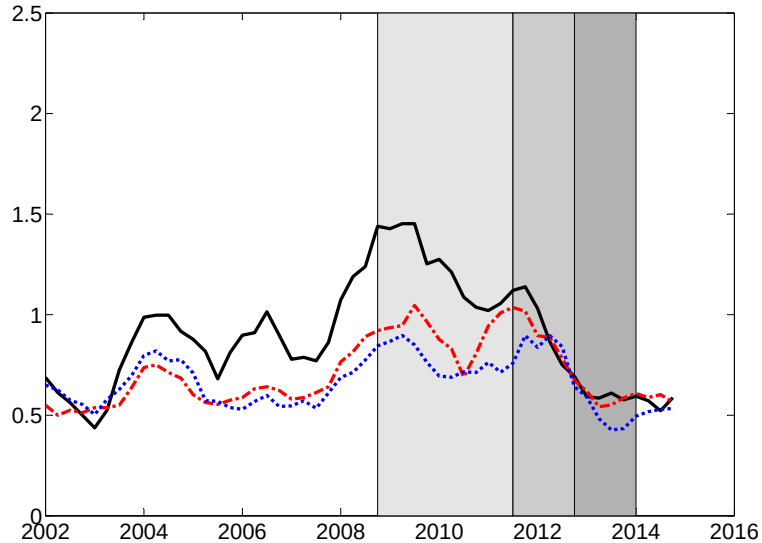
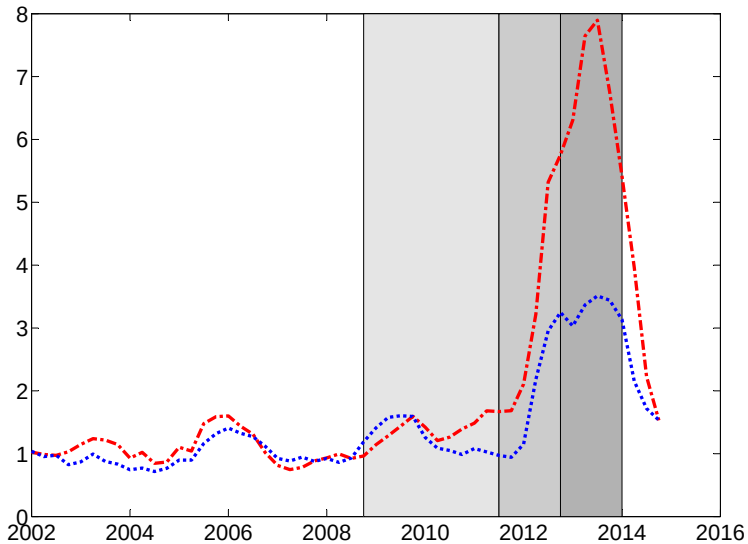



Figure: Disagreement about future consumption growth and inflation 1Q (black), 1Y (red) and 2Y (blue) ahead. (Inter-quantile range in US-SPF, 4-quarter average)

# Fact 3

## But much less than for future IR

Consumption




Inflation

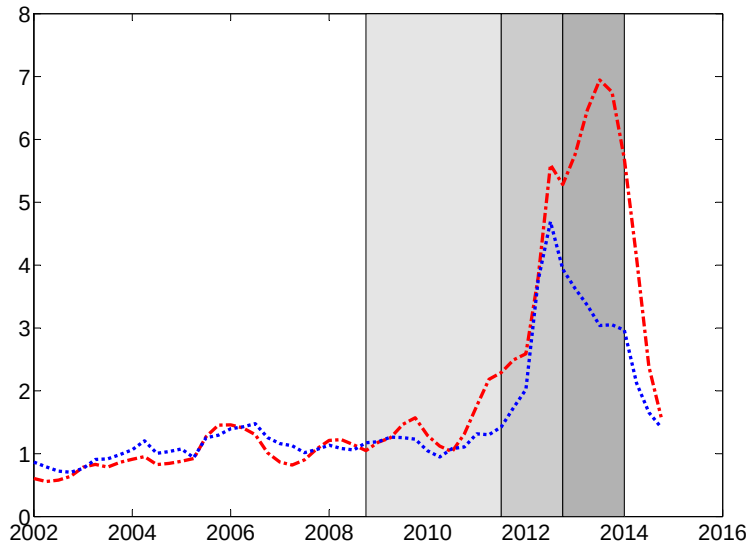



Figure: Disagreement about future consumption growth and inflation relative to disagreement about future short-term interest rates 1Y (red) and 2Y (blue) ahead.

# Take Away

## FG increased disagreement about future monetary policy

- Simple monetary policy rule:

$$r = \phi_\pi \pi + \phi_c \Delta c + \epsilon.$$

- Future interest rate expected by individual $i$:

$$E_t^i(r) = \phi_\pi E_t^i(\pi) + \phi_c E_t^i(\Delta c) + E_t^i(\epsilon).$$

- Drop in heterogeneity of $E_t^i(r)$ not in line with drop in $E_t^i(\pi)$, $E_t^i(\Delta c)$.
  - Off-setting heterogeneity about future deviations: $E_t^i(\epsilon)$.
  - $\{E_t^i(\pi) < 0; E_t^i(\epsilon) > 0\}$ ; $\{E_t^j(\pi) > 0; E_t^j(\epsilon) < 0\}$.

# A Simple NK Model with Heterogenous Beliefs

## Households' family

- Continuum of agents $i \in [0,1]$ maximizing family's welfare:

$$U_0 = \int_0^1 \sum_{t=0}^{\infty} \beta^t e^{\xi_t} \left( \frac{C_{i,t}^{1-\gamma} - 1}{1-\gamma} - \frac{L_{i,t}^{1+\psi}}{1+\psi} \right) di.$$

- Preference shocks:

$$\xi_t = 0 \text{ (normal times)}; \quad \xi_t = -\xi_{ZLB} \text{ (crisis times)}.$$

- Individual budget constraint:

$$P_t C_{i,t} + B_{i,t} = R_{t-1} B_{i,t-1} + W_t L_{i,t} + D_t + Z_{i,t}.$$

- At each $t$, intra-household transfers (agreed if improve $U_t$ or zero):

$$\int_0^1 Z_{i,t} di = 0.$$

# A Simple NK Model with Heterogenous Beliefs

## Monetary policy

- Monetary policy constrained by the ZLB:

$$R_t = \max\{R\Delta_t \Pi_t^{\phi}, 1\}.$$

- $\Delta_t = 0$ forces the rate at the ZLB

- The maximal degree of policy stimulus in terms of deviation from the steady state is

$$r_t = \log R_t - \log R = -\log R$$

# A Simple NK Model with Heterogenous Beliefs

## Information

Private agents:

- observe current shock $\xi_0$,
- observe the current allocation,
- don't know future shocks hence length of the trap $T$,
- uncertain about commitment ability of central bank $\{\Delta_t\}_{t\geq 0}$.

# A Simple NK Model with Heterogenous Beliefs

## Heterogeneity

- Sequence of shocks $\{\xi_t\}_{t\geq 0}$ such that ZLB binds up to $T$.
- Agents agree on $R_t = 1$ for $T^{CB}$ periods.
- Two types of agents:

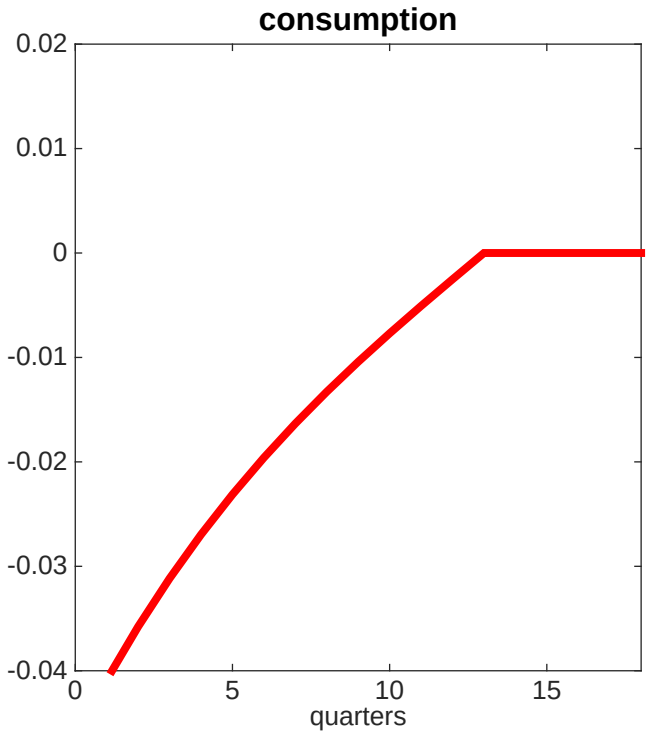
  $\alpha$ pessimists about commitment ability believe policy can only be *Delphic*:

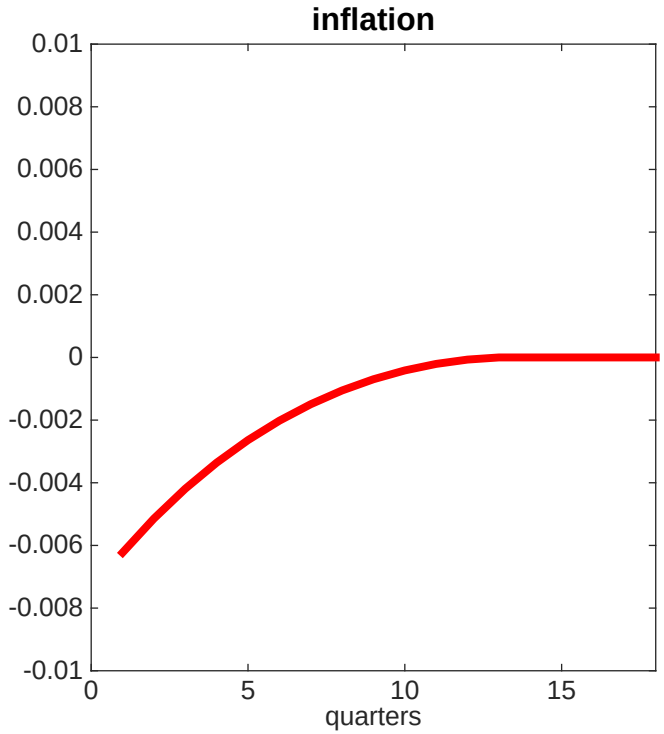
  $$E_{0,pes}[T] = T^{CB}.$$

  $1-\alpha$ optimists about commitment ability believe policy can be *Odyssean*:

  $$E_{0,opt}[T] < T^{CB}$$

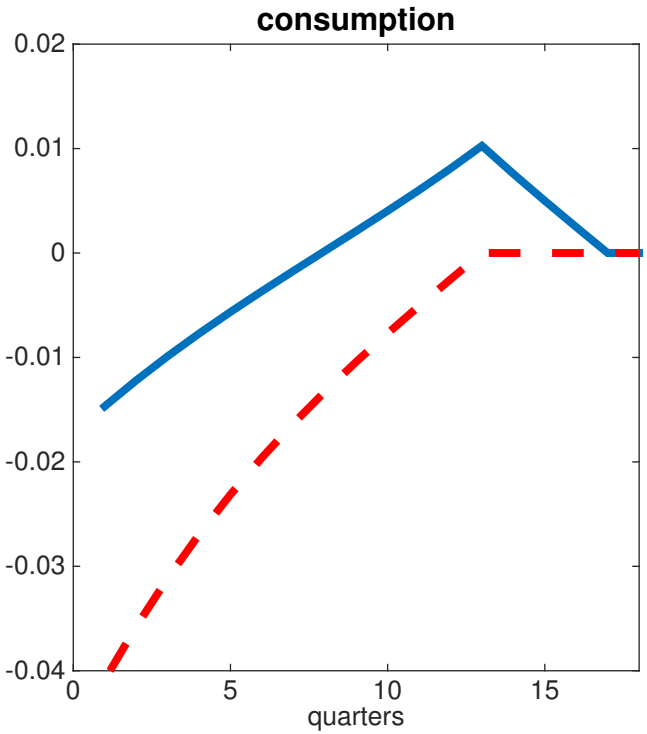
# Inflation Targeting (Delphic Forward Guidance, $\alpha = 1$)

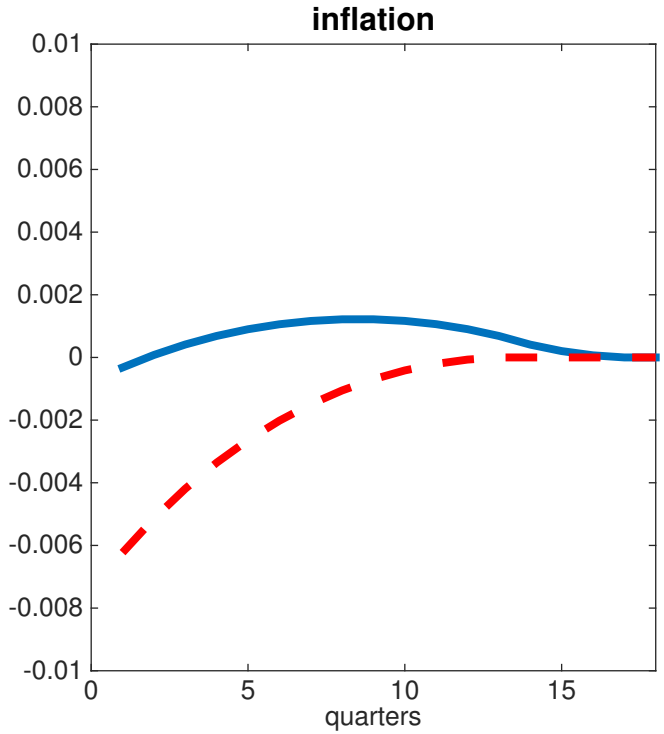



- The shock lasts 12 quarters.
- Interest rate is at ZLB for 12 quarters.

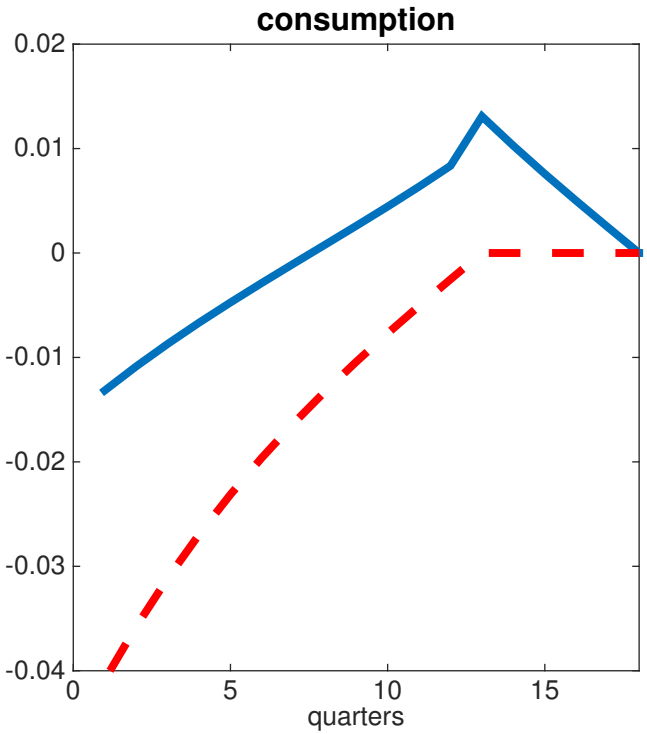
# Odyssean Guidance with agreement ($\alpha = 0$)

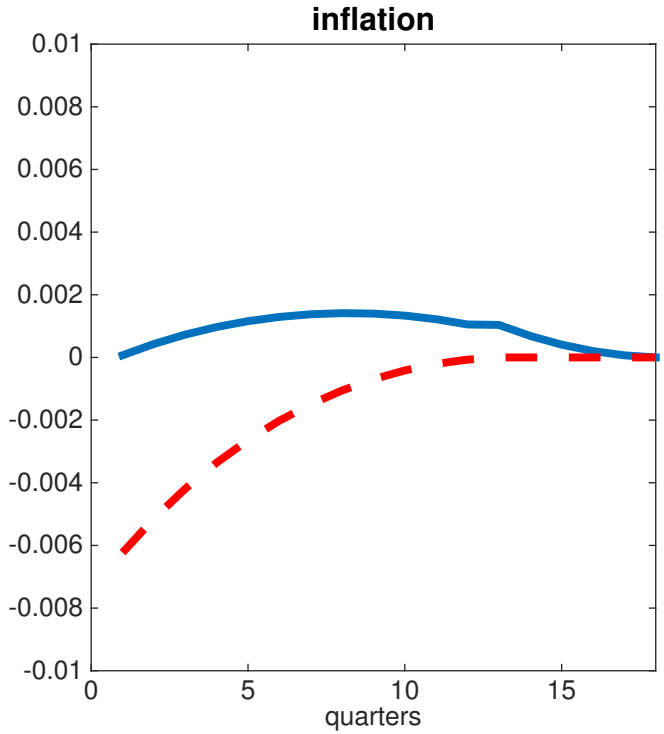



- The shock lasts 12 quarters.
- Interest rate is at ZLB for 12+5 quarters.

# Forward Guidance with disagreement ($\alpha = 0.1$)

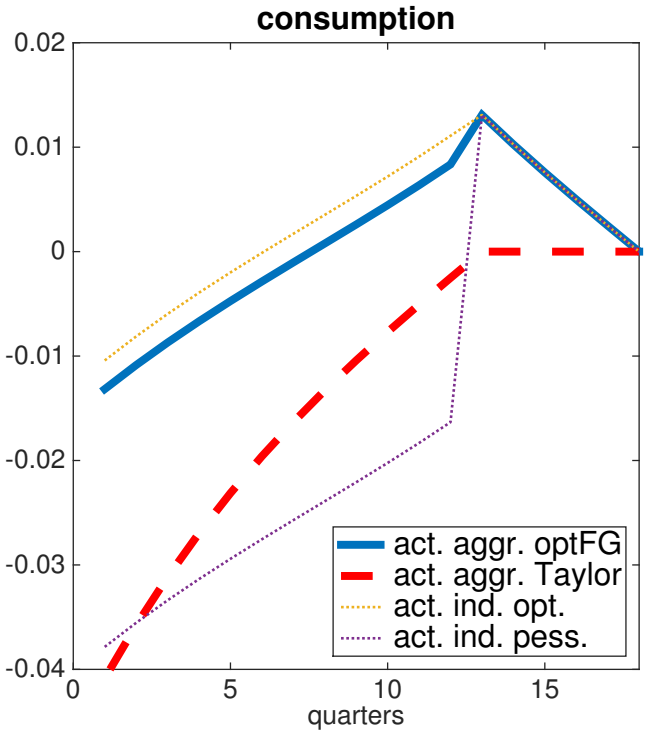


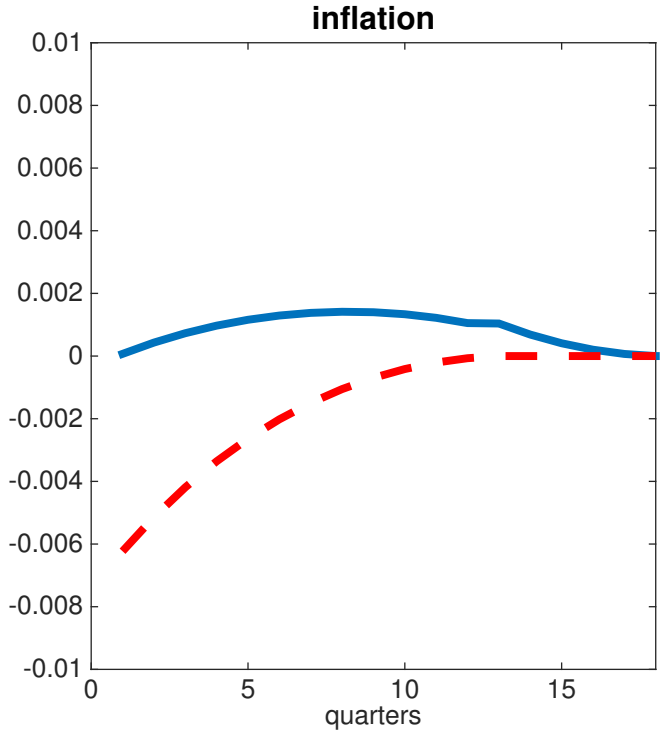




- The shock lasts 12 quarters.
- Interest rate is at ZLB for 12+6 quarters.

# Optimal Forward Guidance with disagreement ($\alpha = 0.1$)

## How the model works: actions

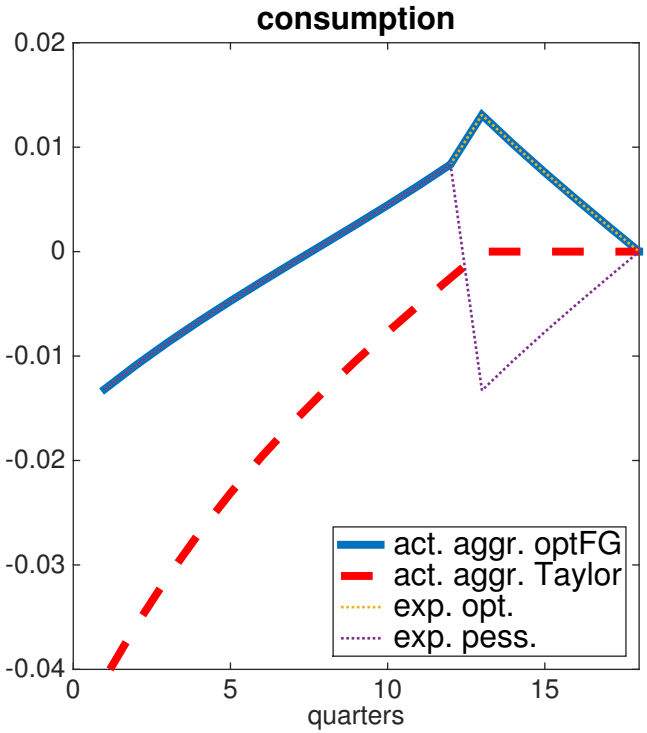


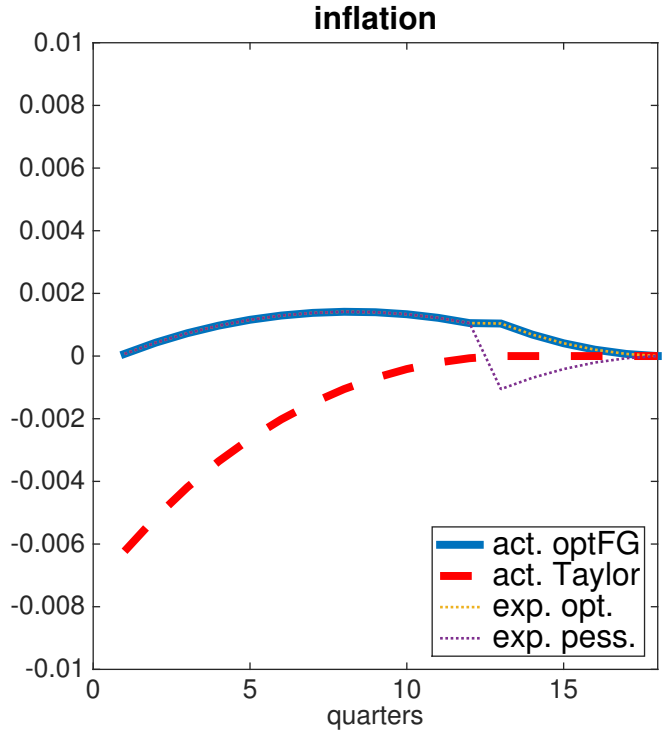




- The shock lasts 12 quarters.
- Interest rate is at ZLB for 12+6 quarters.

# Optimal Forward Guidance with disagreement ($\alpha = 0.1$)

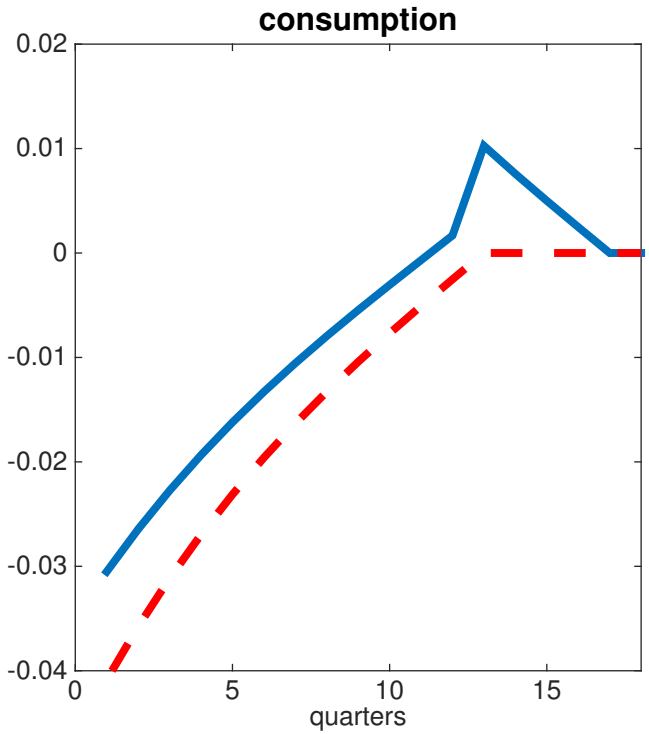
## How the model works: expectations at time 0

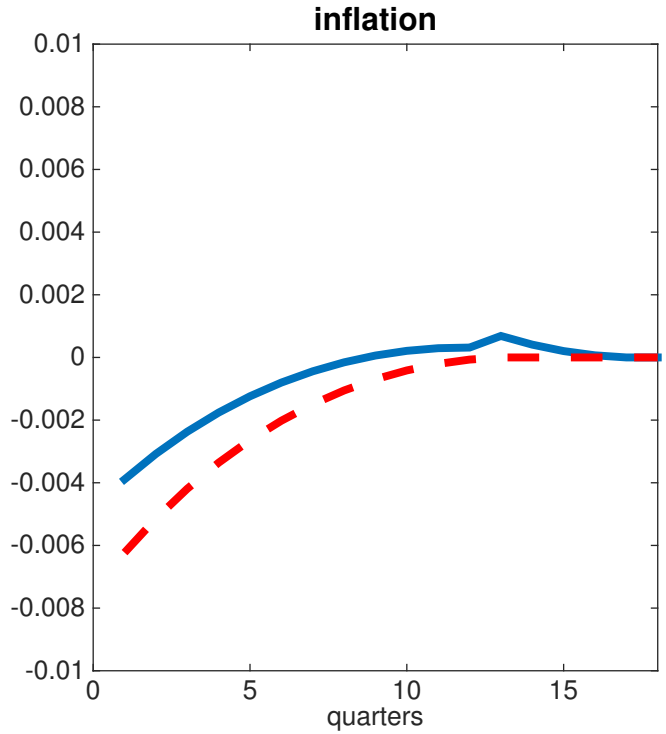



- The shock lasts 12 quarters.
- Interest rate is at ZLB for 12+6 quarters.

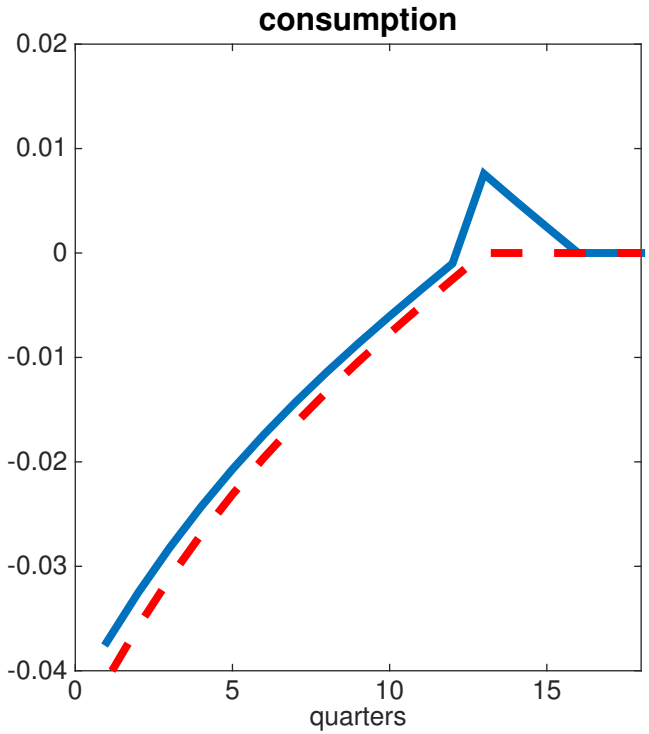
# Optimal Forward Guidance with disagreement ($\alpha = 0.3$)

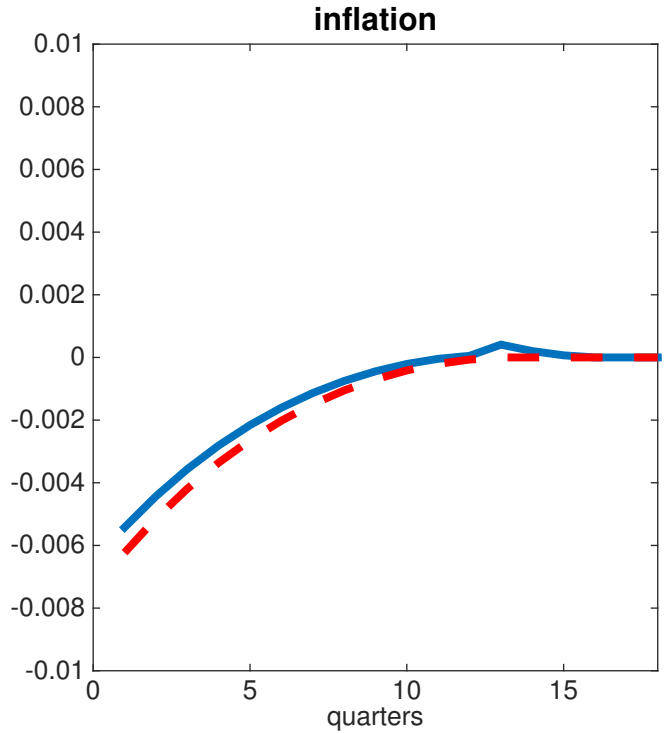



- The shock lasts 12 quarters.
- Interest rate is at ZLB for 12+5 quarters.

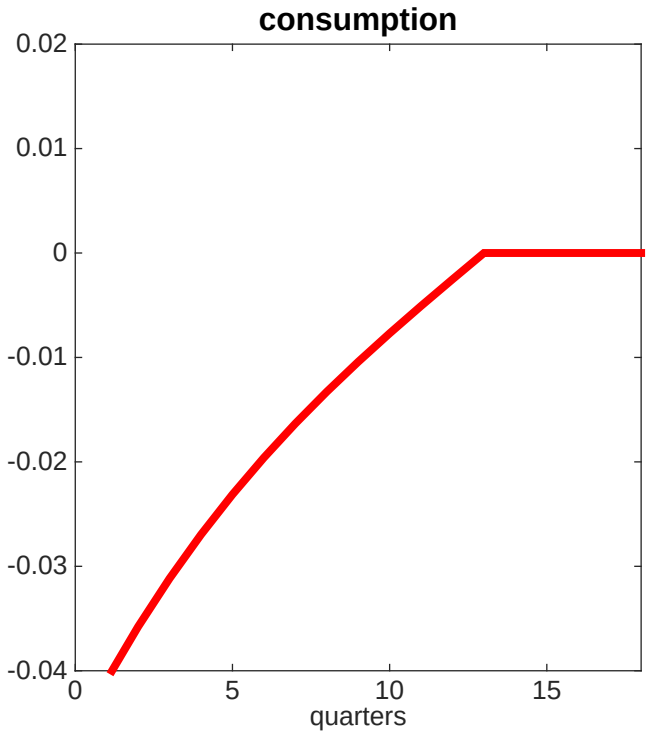
# Optimal Forward Guidance with disagreement ($\alpha = 0.4$)

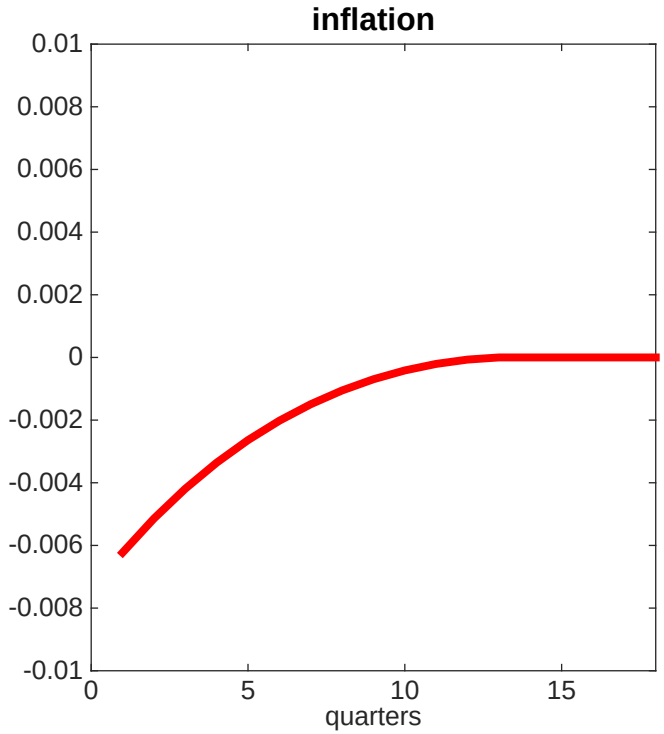



- The shock lasts 12 quarters.
- Interest rate is at ZLB for 12+4 quarters.

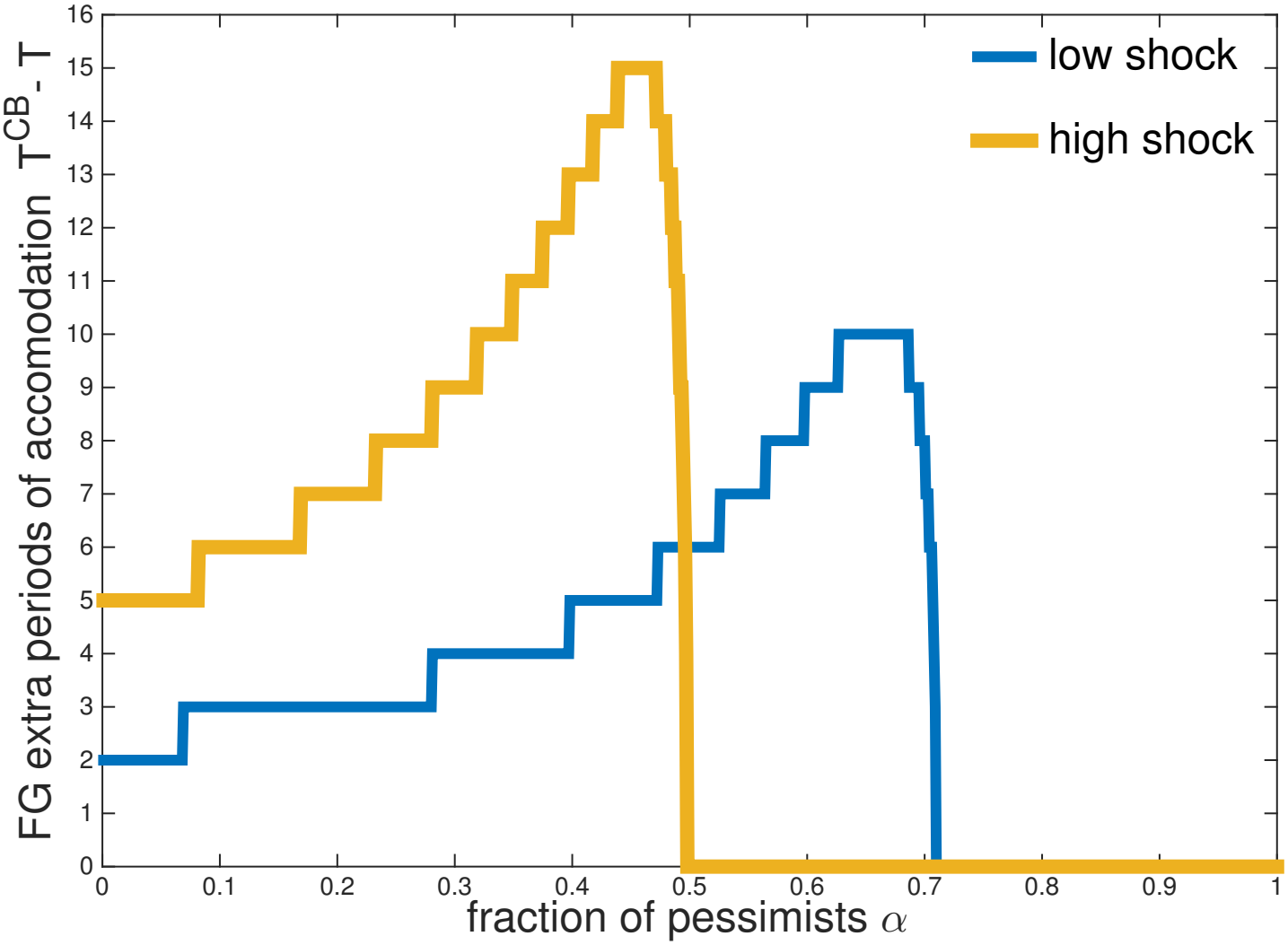
# Optimal policy with disagreement ($\alpha = 0.5$)




- The shock lasts 12 quarters.
- Interest rate is at ZLB for 12+0 quarters.

# Optimal policy with disagreement



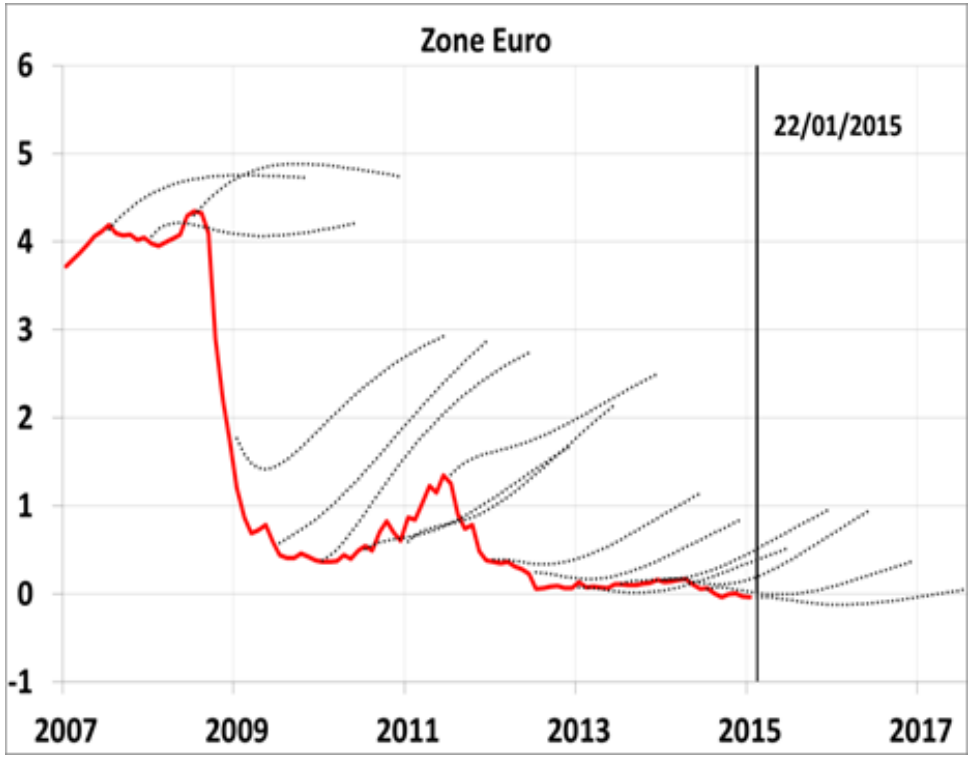
# Conclusion

1. Evidence suggesting agents disagreed on FG.
2. We build a std NK model with heterogenous beliefs which
   - hampers odyssean FG.
   - potentially make odyssean announcements worsens things.
3. Underline limits of looking at (expected) IR to assess impact of FG.

# Annexes

# Fact 0 - euro-area

FG lowered expectations about future short-term interest rates



# Forward Guidance announcements

Federal Reserve press release of 9 August 2011:

> *To promote the ongoing economic recovery and to help ensure that inflation, over time, is at levels consistent with its mandate, 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 – 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.*

ECB introductory statement of 4 July 2013:

> *The Governing Council expects the key ECB interest rates to remain at present or lower levels for an extended period of time. This expectation is based on the overall subdued outlook for inflation extending into the medium term, given the broad-based weakness in the real economy and subdued monetary dynamics.*

# Delphic and Odyssean Forward Guidance

Charles Evans (2012):

> *We distinguish between Odyssean forward guidance, which publicly commits the FOMC to a future action, and Delphic forward guidance, which merely forecasts macroeconomic performance and likely monetary policy actions.*

Founding fathers of FG (Krugman, Eggertsson and Woodford) were all about Odyssean

# Motivation

Charles I. Plosser (March 6, 2014):

> *The FOMC has not been clear about the purpose of its forward guidance. Is it purely a transparency device, or is it a way to commit to a more accommodating future policy stance to add more accommodation today?*

**Should we care about the perception of forward guidance policy by the private sector?**

# Further Evidence

## Disagreement about inflation should have been lower than observed

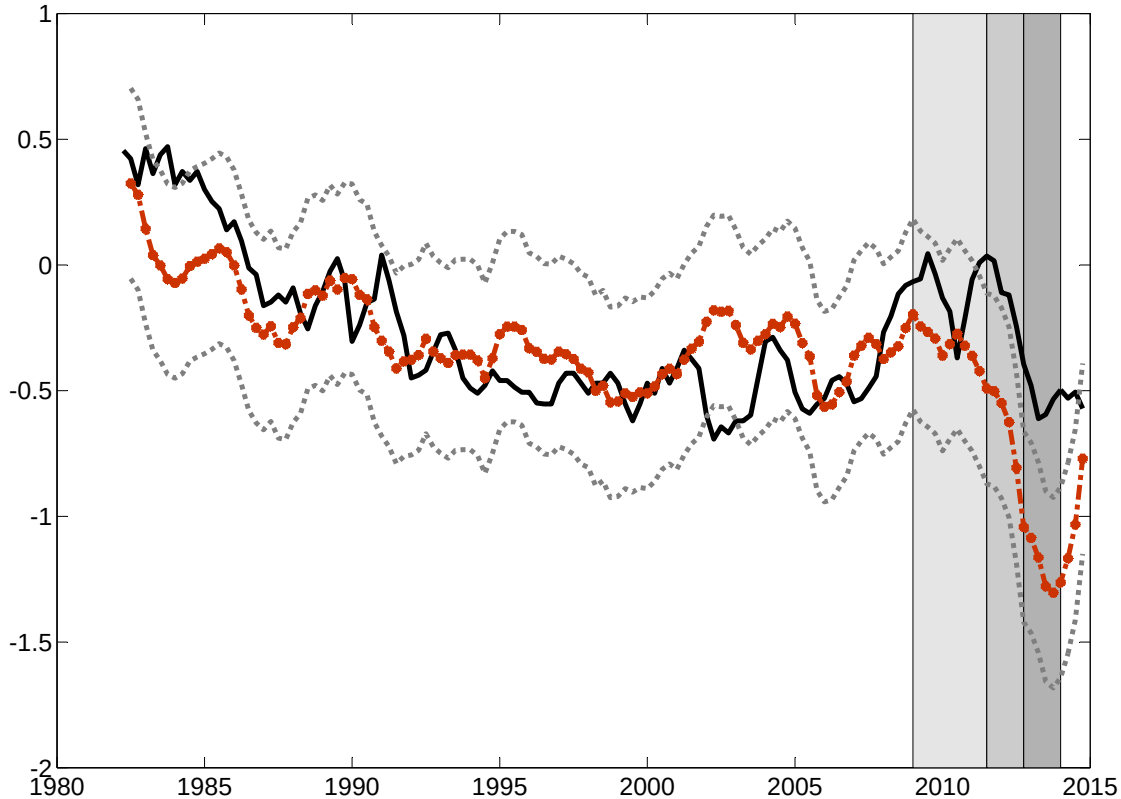



Figure: Disagreement (in log) about future inflation: observed (black) vs. predicted (red), with 90% CI.

# Further Evidence

## Other countries

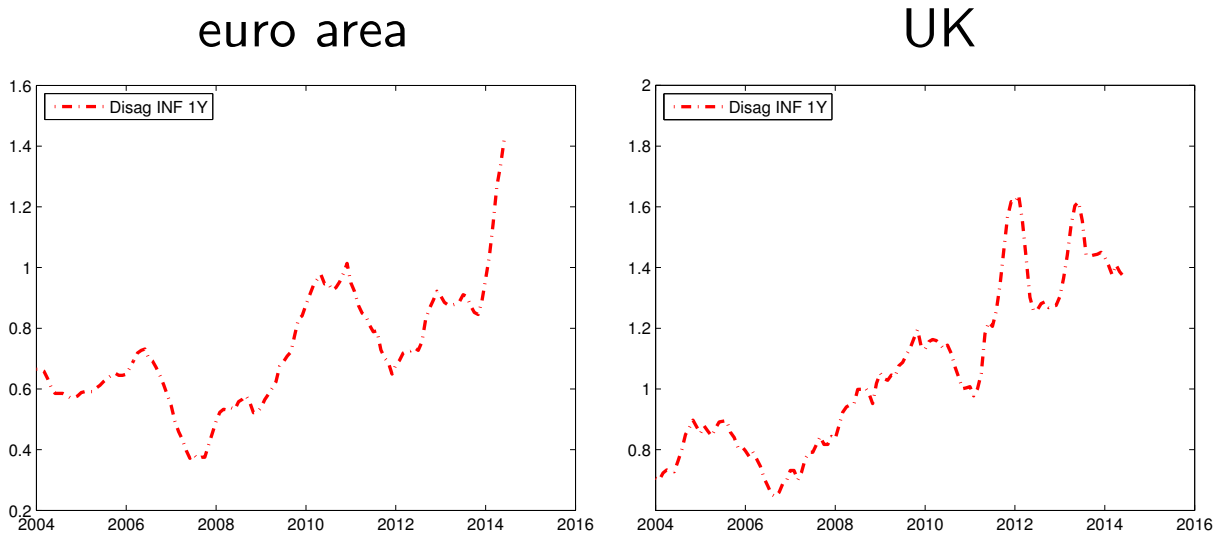



Figure: Disagreement about future inflation relative to disagreement about future short-term interest rates 1Y ahead. (ratio of cross-section std-dev in Consensus Economics forecasts)

# Inflation Targeting (Delphic Forward Guidance)

| time | $E_{i,0}\left[c_{i,t}\right],\ \alpha = 1$ |
|---|---|
| $T < t$ | $0$ |
| $t = T$ | $\gamma^{-1}((\log R - \xi)$ |
| $0 < t < T$ | $\gamma^{-1}((\log R - \xi) + E_{i,0}\left[\pi_{t+1}\right]) + E_{i,0}\left[c_{i,t+1}\right]$ |

# Odyssean Forward Guidance

| time | $E_{i,0}[c_{i,t}],\ \alpha = 0$ |
|---|---|
| $t > T^{CB}$ | $0$ |
| $t = T^{CB}$ | $\gamma^{-1}(\log R)$ |
| $T < t < T^{CB}$ | $\gamma^{-1}(\log R + E_{i,0}[\pi_{t+1}]) + E_{i,0}[c_{i,t+1}]$ |
| $t = T$ | $\gamma^{-1}((\log R - \xi) + E_{i,0}[\pi_{t+1}]) + E_{i,0}[c_{i,t+1}]$ |
| $0 < t < T$ | $\gamma^{-1}((\log R - \xi) + E_{i,0}[\pi_{t+1}]) + E_{i,0}[c_{i,t+1}]$ |