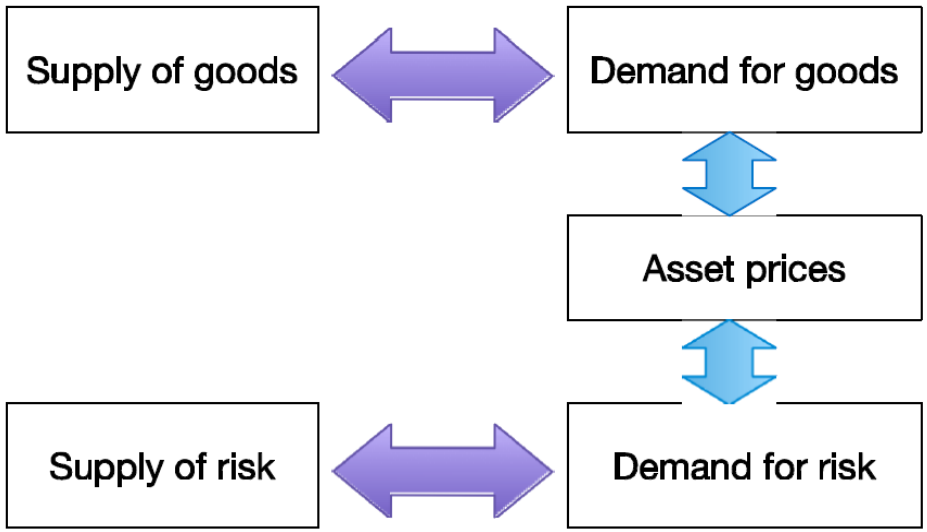
Monetary Policy with Opinionated Markets

Ricardo J. Caballero and Alp Simsek
MIT

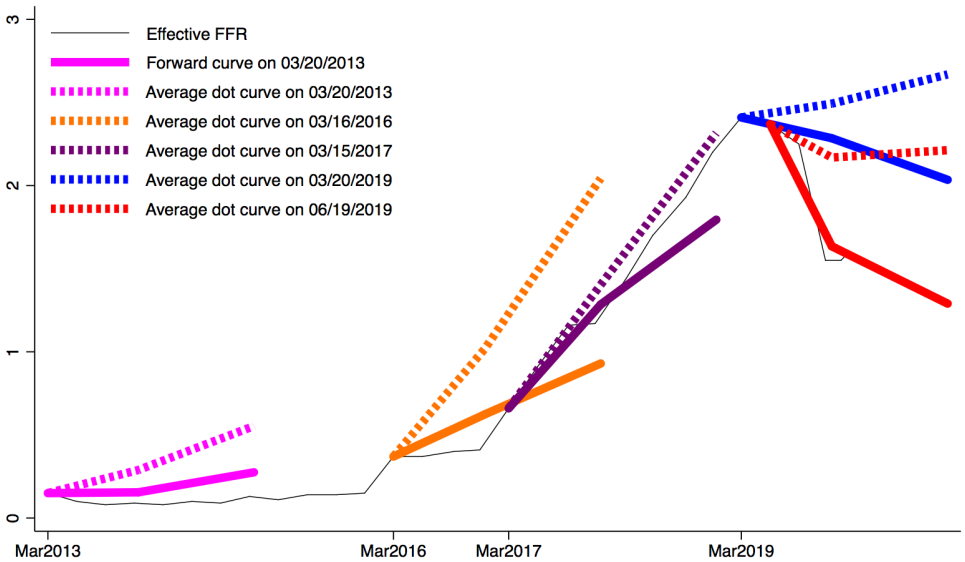
ECB, October 19, 2020

Agenda: "Risk Centric" Macro/Policy



- Central banks care about the top row... but operate in the lower row...
- Beliefs play a huge rule in financial markets
  - Previous papers: Beliefs heterogeneity within private sector; implications for macropru, PMP, LSAPs
  - **This paper: Beliefs differences between "the Fed" and the Market**

The Fed and markets disagree about interest rates



- Risk premium adjustment? But large gaps still remain
- Survey-based measures show qualitatively similar gaps (e.g., Greenbook vs Blue Chip)
- Other countries where CB's forecasts are published (e.g., Sweden, Norway, New Zealand)

The Fed and markets disagree about interest rates

- Literature: Fed's signaling of superior info about actions/economy
- But market disagrees with Fed even **after** the FOMC announcements
- **Opinionated markets:** Dec 2007: "hawkish" interest rate cut. WSJ:

> *"From talking to clients and traders, there is in their view no question the Fed has fallen way behind the curve," said David Greenlaw, economist at Morgan Stanley.* **"There's a growing sense the Fed doesn't get it."**

This paper: A model with Fed-market belief disagreements

We develop a model with **opinionated markets.** Key features:

(i) **Fed and market disagree about future aggregate demand**

(ii) **They both learn from data**

Main findings:

- Natural explanation for disagreements about interest rates
- Disagreements matter for optimal monetary policy

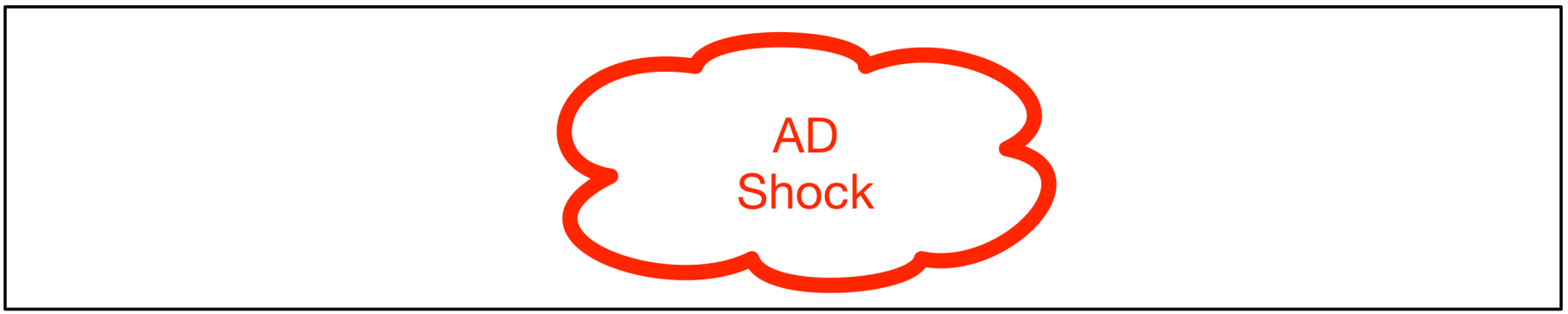
Extensions:

- Adding a NKPC: Disagreements as endogenous cost-push shock
- Information asymmetry and signaling:
  MP announcements (disagreements about signaling): "MP shocks" or "information"
- Heterogeneous data sensitivity (of beliefs):
  Every macro shock has an implicit "MP shock" in it

Setup: Fed sets rates under uncertainty about AD shocks

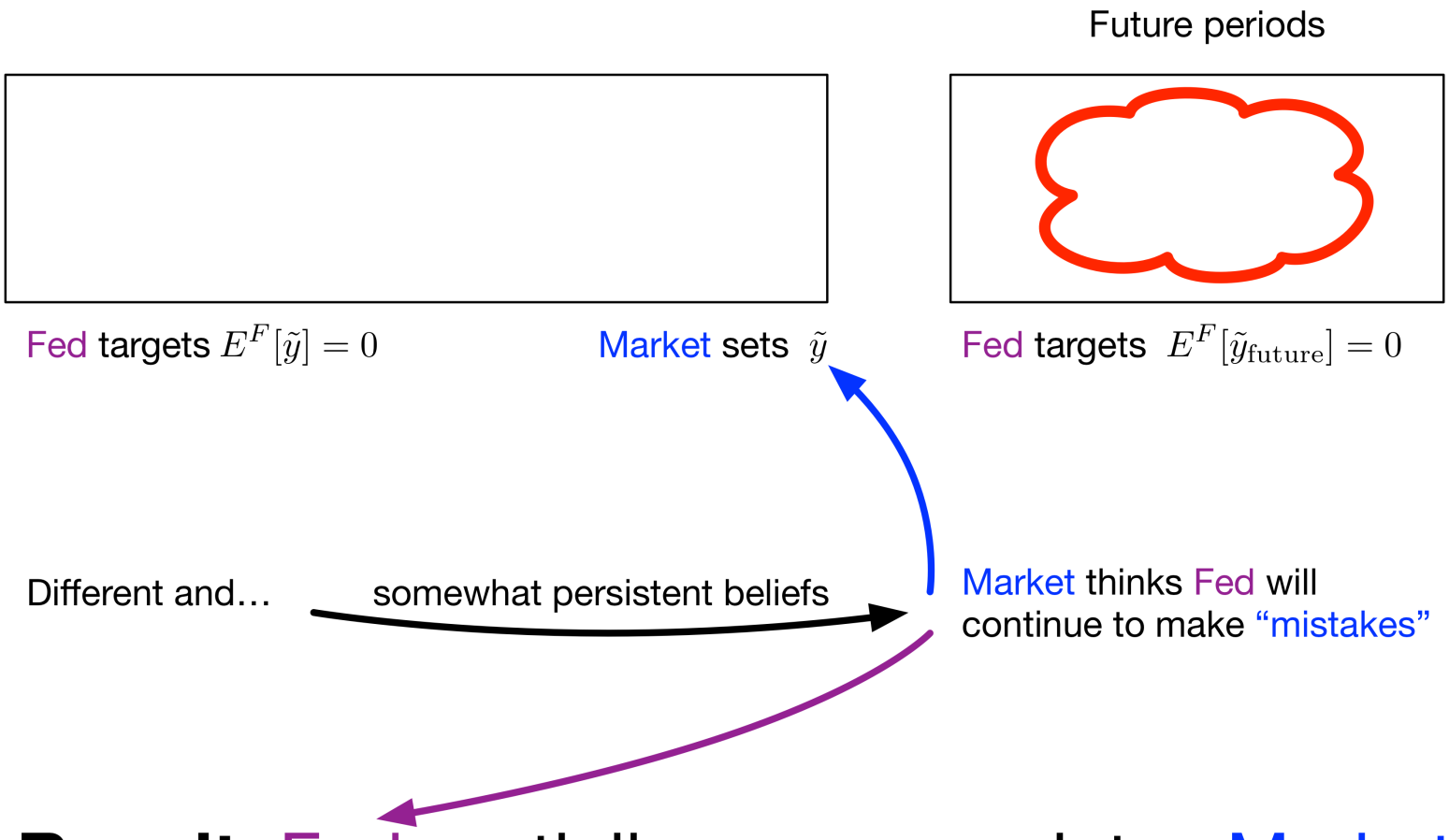
- AD shock: Moves current expenditure for given potential output

Current period



Fed sets rate to target $E^F[\tilde{y}] = 0$ Market "sets" $\tilde{y}$

Different beliefs about AD shock
=> Market thinks Fed makes a "mistake"



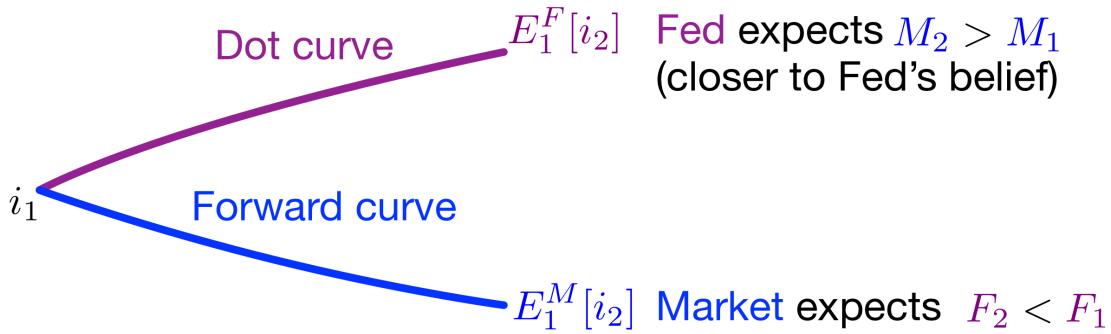
Result: Fed partially accommodates Market to mitigate "mistake"s impact on current output

- (More accommodation when beliefs are more entrenched)

Learning (Bayesian) about AD shock

$i_1 \sim A(F_1, M_1)$ $\quad$ $i_2 \sim A(F_2, M_2)$

More optimistic Fed $(F_1 > M_1)$



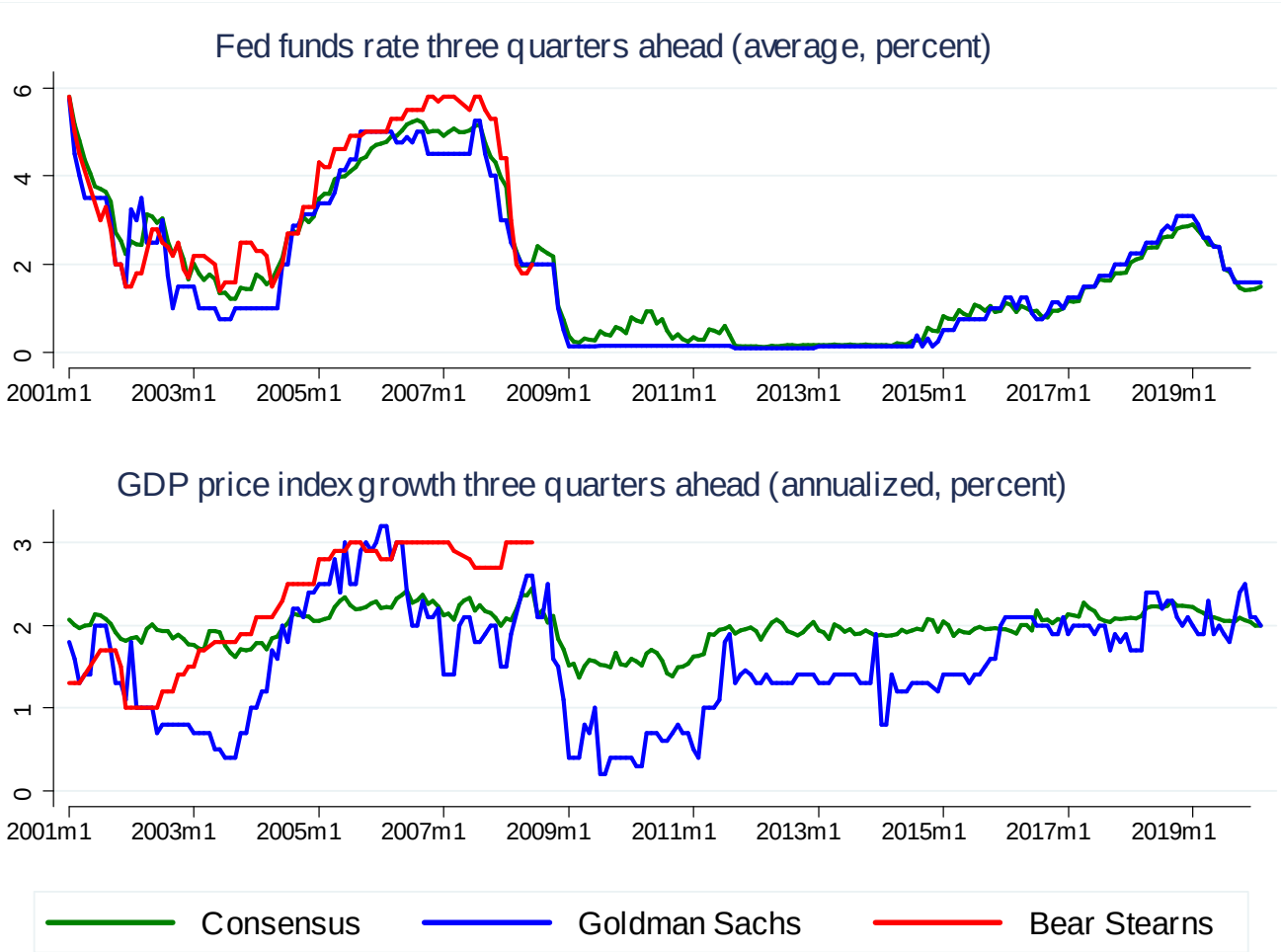
Result: Disagreement + Learning explains Dot-Forward gaps

Roadmap

1. Motivating facts from forecasters
2. Model
3. Disagreements
4. Extensions

Blue Chip forecasts support our ingredients

1. **Rate forecasts correlate with AD (inflation) forecasts**
2. Forecasts feature **confident disagreement**



Roadmap

Consider the standard NK model with AD shocks

- Market (M) with utility $\log C_t - \frac{N_t^{1+\varphi}}{1+\varphi}$ and discount rate ρ.
- Technology: Continuum of firms ν with $Y_t(\nu) = e^{a_t} N_t(\nu)^{1-\alpha}$.
- Nominal prices fully sticky (can relax) $\Longrightarrow Y_t(\nu) = Y_t = C_t$.
- **AD shocks** g_t in period t: News about future $a_{t+1} = a_t + g_t$.
- Log-linearized output gives the IS curve:

$$\tilde{y}_t = -(i_t - \rho) + g_t + \overline{E}_t^M [\tilde{y}_{t+1}].$$

- Monetary policy:

$$E_t^F [\tilde{y}_t] = 0.$$

Outcomes reflect MP "mistakes"

- Recall IS:

$$\tilde{y}_t = -\left(i_t - \rho\right) + g_t + \overline{E}_t^M \left[\tilde{y}_{t+1}\right].$$

- Equilibrium interest rate (i.e, $E_t^F \left[\tilde{y}_t\right] = 0$)

$$i_t = \rho + \underbrace{E_t^F \left[g_t\right]}_{\text{expected AD}} + \overbrace{E_t^F \left[E_{t+1}^M \left[\tilde{y}_{t+1}\right]\right]}^{\textbf{perceived "mistake"}}$$

- Equilibrium output gap

$$\tilde{y}_t = \underbrace{g_t - E_t^F \left[g_t\right]}_{\text{AD shock}} + E_{t+1}^M \left[\tilde{y}_{t+1}\right] - E_t^F \left[E_{t+1}^M \left[\tilde{y}_{t+1}\right]\right].$$

Beliefs: Persistent AD shock induces disagreement

$$g_t = g + \underbrace{u}_{\text{unknown component}} + v_t$$

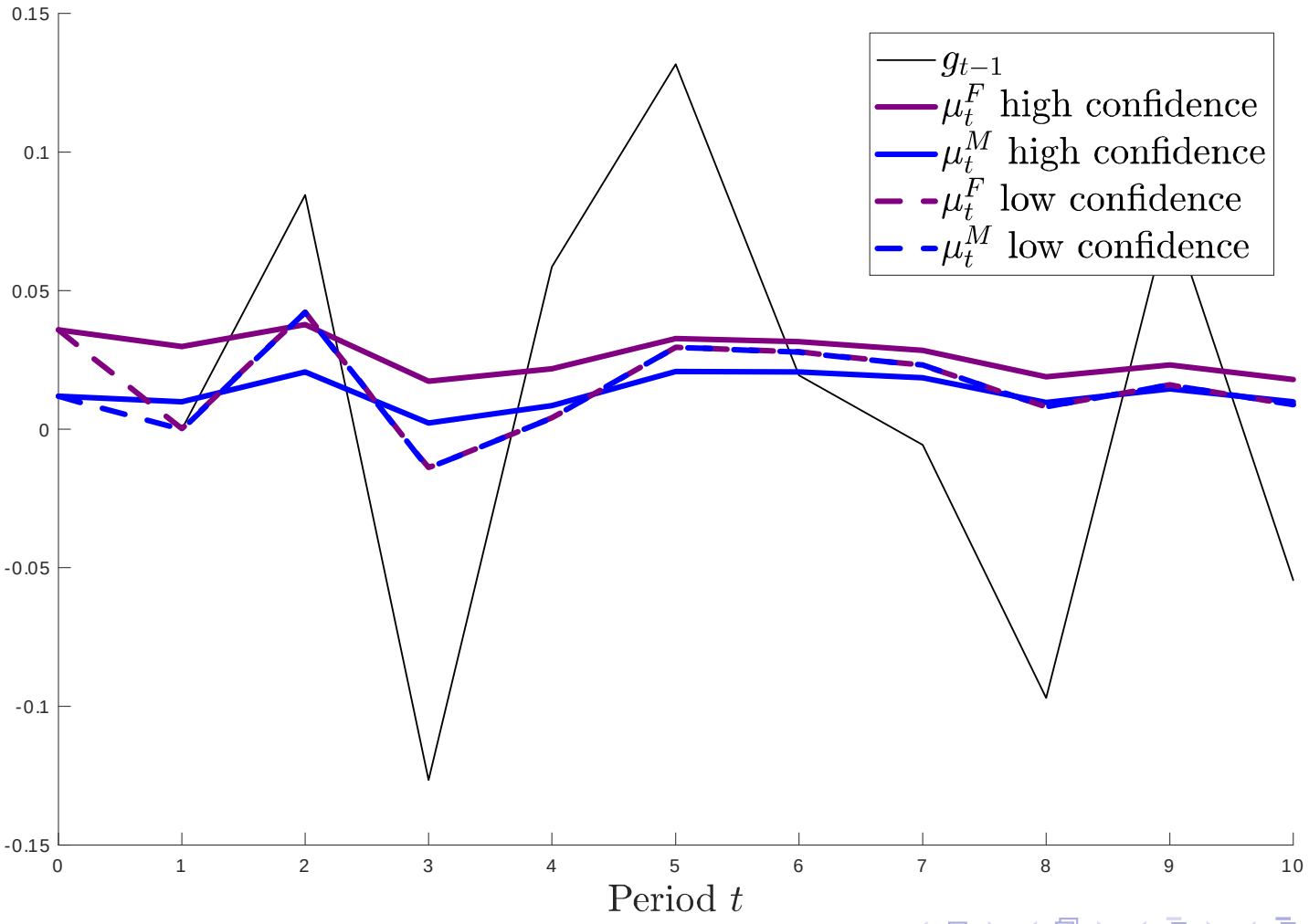
- **Heterogeneous prior beliefs (agree to disagree)**:

$$u \sim N\left(u_0^j, \quad \frac{var\left(v_t\right)}{C_0^j}\right) \text{ for } j \in \{F, M\}$$

- Conditional belief about AD $\mu_t^j \equiv E_t^j\left[g_t\right]$. Note $\mu_0^j = g + u_0^j$
- Bayesian updating: C_0^j ("confidence") controls data sensitivity
- Define relative confidence as $\mathbf{c}_{s,s+t}^j = \frac{C_0^j + s}{C_0^j + s + t}$

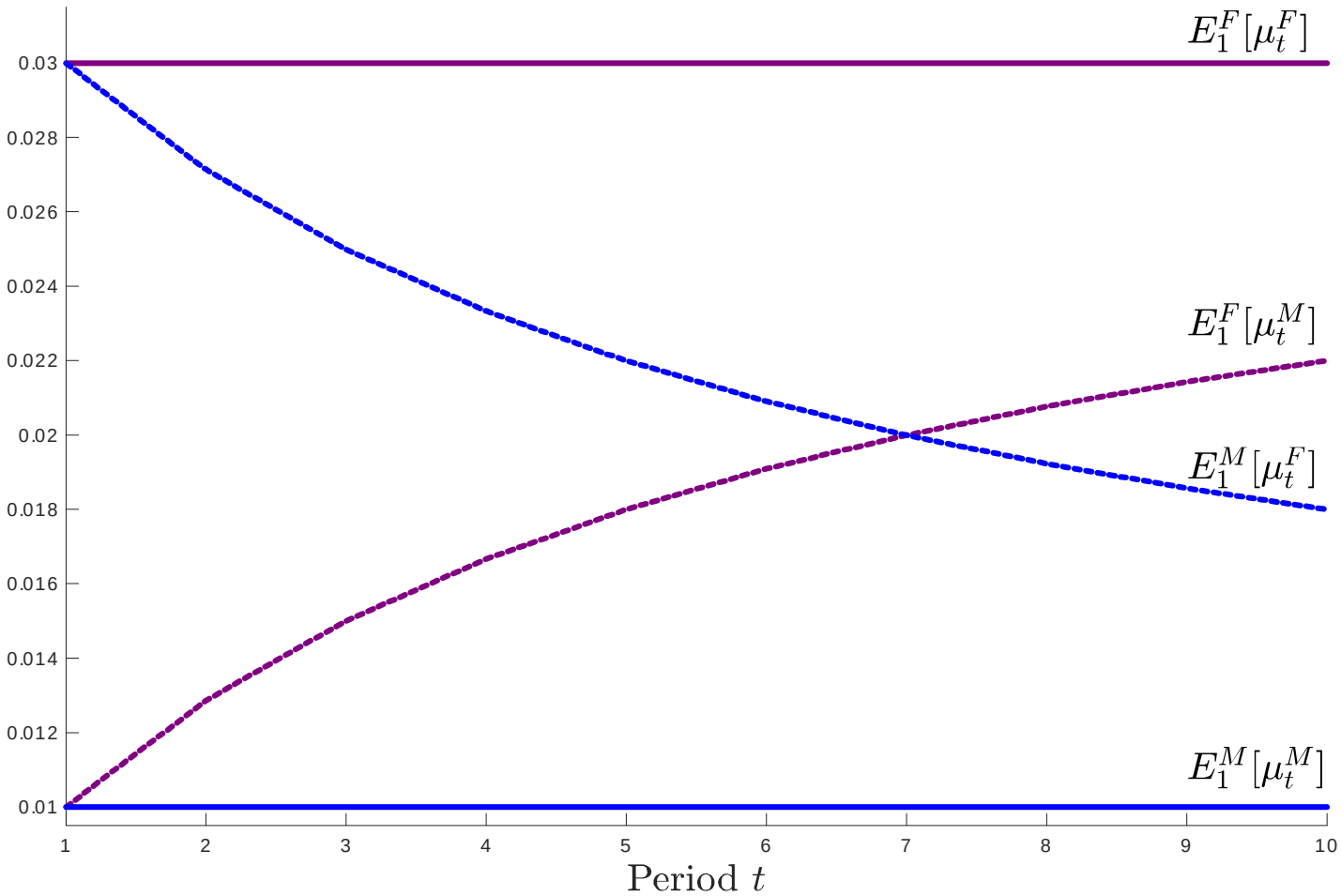
Agents learn over time

$$\mu_t^j = \mathbf{c}_{t-1,t}^j \mu_{t-1}^j + \left(1 - \mathbf{c}_{t-1,t}^j\right) g_{t-1}$$



Agents expect the other agent to "learn"

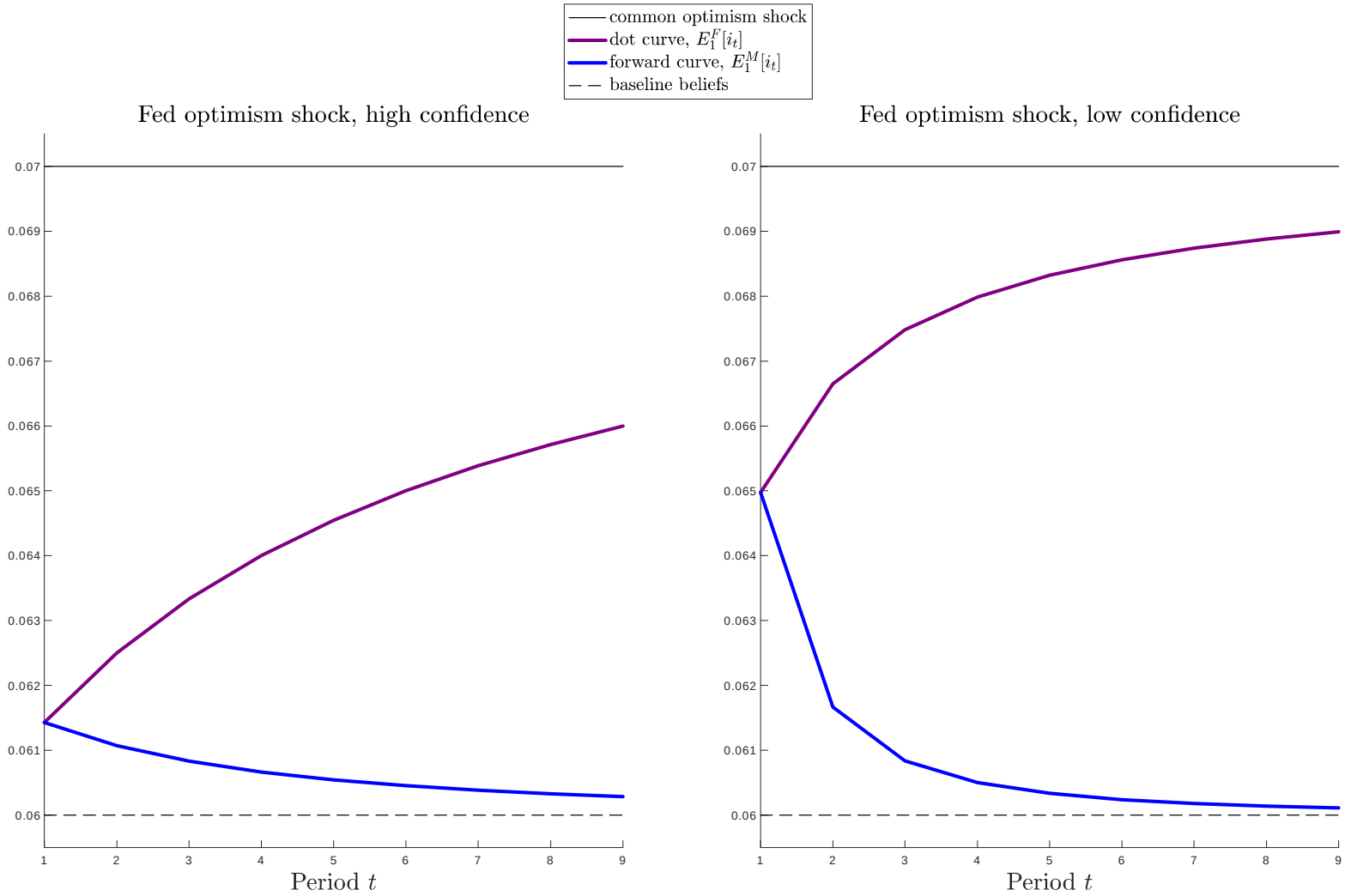
$$E_s^j\left[\mu_{s+t}^{j'}\right] = \mathbf{c}_{s,s+t}^{j'}\mu_s^{j'} + \left(1 - \mathbf{c}_{s,s+t}^{j'}\right)\mu_s^j$$



Roadmap

1. Motivating facts from forecasters
2. Model
3. Disagreements
4. Extensions

Result: Disagreements affect current & expected rates



Roadmap

1. Motivating facts from forecasters
2. Model
3. Disagreements
4. Extensions

NKPC and "Cost Push" Shocks

- Consider the case with partial price flexibility, $\kappa > 0$
- Then we can write the NKPC as

$$\begin{aligned} \pi_t &= \kappa \tilde{y}_t + \beta \overline{E}_t^F \left[\pi_{t+1}\right] + u_t \\ \text{where } u_t &= \beta \left(\overline{E}_t^M \left[\pi_{t+1}\right] - \overline{E}_t^F \left[\pi_{t+1}\right] \right). \end{aligned}$$

- Disagreements acts as endogenous "cost push" shocks, which breaks the divine coincidence and creates a trade-off between stabilizing output and inflation (Clarida, Gali, Gertler 1999)
- More accommodation of market's beliefs

Information asymmetry and signaling: Results are robust

Model with different μ_0^j and common C_0 **except:**

- In period 0 (only) Fed receives **private** signal (before i_0):

$$x^F = u + \varepsilon^F, \text{ where } \varepsilon^F \sim N\left(0, I^{-1}\Sigma\right)$$

- Market agrees with Fed that the signal is informative

Information asymmetry and signaling: Results are robust

Model with different μ_0^j and common C_0 **except:**

- In period 0 (only) Fed receives **private** signal (before i_0):

$$x^F = u + \varepsilon^F, \text{ where } \varepsilon^F \sim N\left(0, I^{-1}\Sigma\right)$$

- Market agrees with Fed that the signal is informative

Equilibrium rate with signaling:

$$i_0 = \rho + g + \underbrace{\frac{I}{C_0 + I} x^F}_{\textbf{signaling}} + \underbrace{\frac{C_0}{C_0 + I}\left(\left(1 - \overline{\mathbf{c}}_{0,1}\right) u_0^F + \overline{\mathbf{c}}_{0,1}\, u_0^M\right)}_{\textbf{disagreement}}$$

Signaling with disagreement about Fed's information

- Now suppose Market has two types: Agreeable or Disagreeable
- Disagreeable type thinks x^F **is uninformative**.
- **Fed sets i_0 without knowing the market's type**:

$$i_0 = \rho + g + \frac{I}{C_0 + I}\left(\overbrace{< x^F}^{F \text{ discounts its signal}}\right) + ...$$

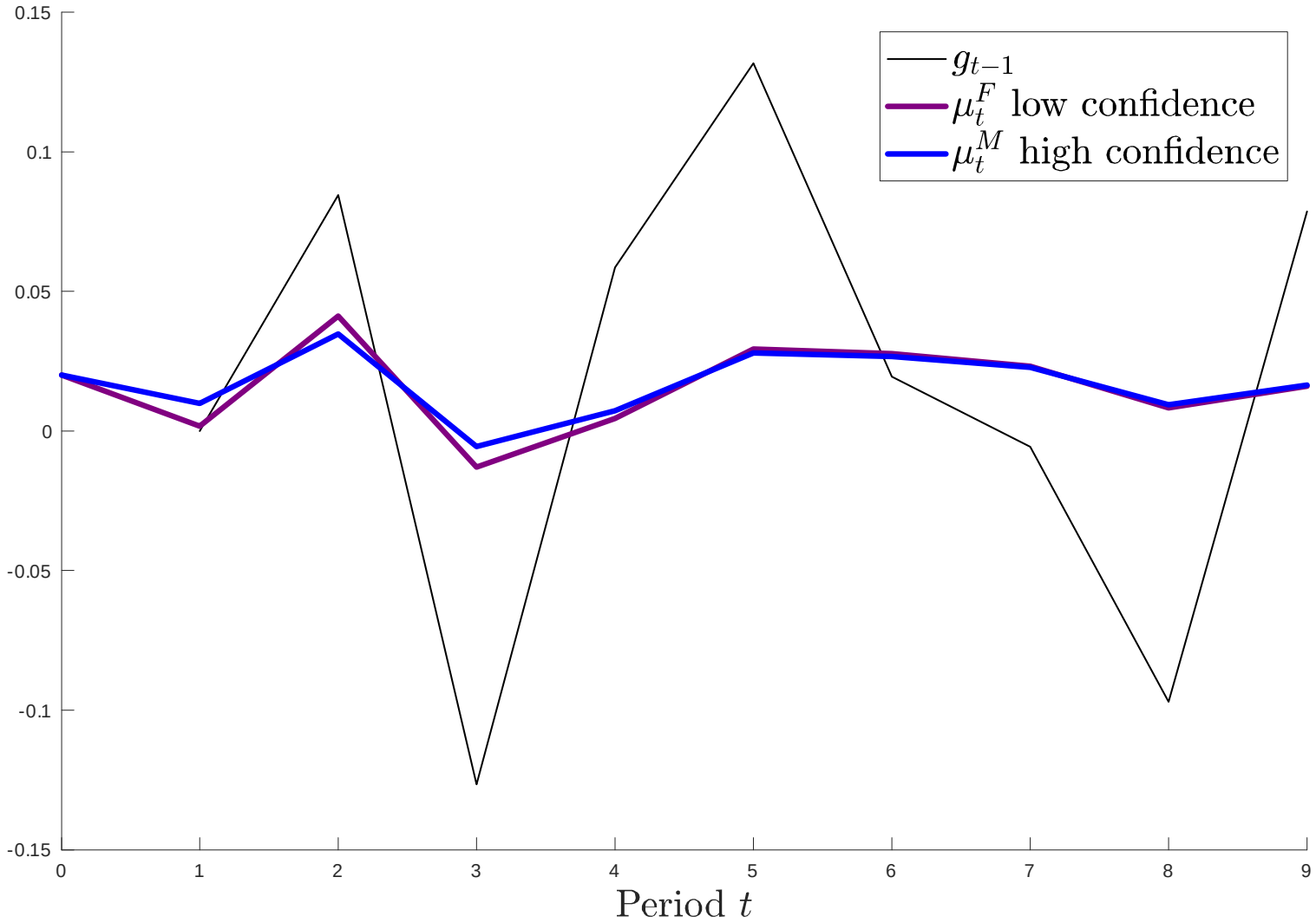
- Suppose signal is positive $x^F > 0$. Then

$$E^F[\tilde{y}_0] \begin{cases} < 0 & \text{if type } D \\ > 0 & \text{if type } A \end{cases}$$

MP shocks: "Mistake" $(i_0 \uparrow, E[\tilde{y}_0] \downarrow)$ or **"information"** $(i_0 \uparrow, E[\tilde{y}_0] \uparrow)$

Heterogeneous data sensitivity: "MP mistake" shocks

Back to no signaling. Suppose heterogeneous sensitivity, e.g., $C_0^F < C_0^M$



Shocks come bundled with a "MP mistake" shock

$$\tilde{y}_t = \underbrace{g_t - E_t^F[g_t]}_{\text{AD shock}} + \underbrace{E_{t+1}^M[\tilde{y}_{t+1}] - E_t^F\left[E_{t+1}^M[\tilde{y}_{t+1}]\right]}_{\textbf{"mistake" shock}}.$$

- **Result:** Heterogenous sensitivity affects the output impact of shocks

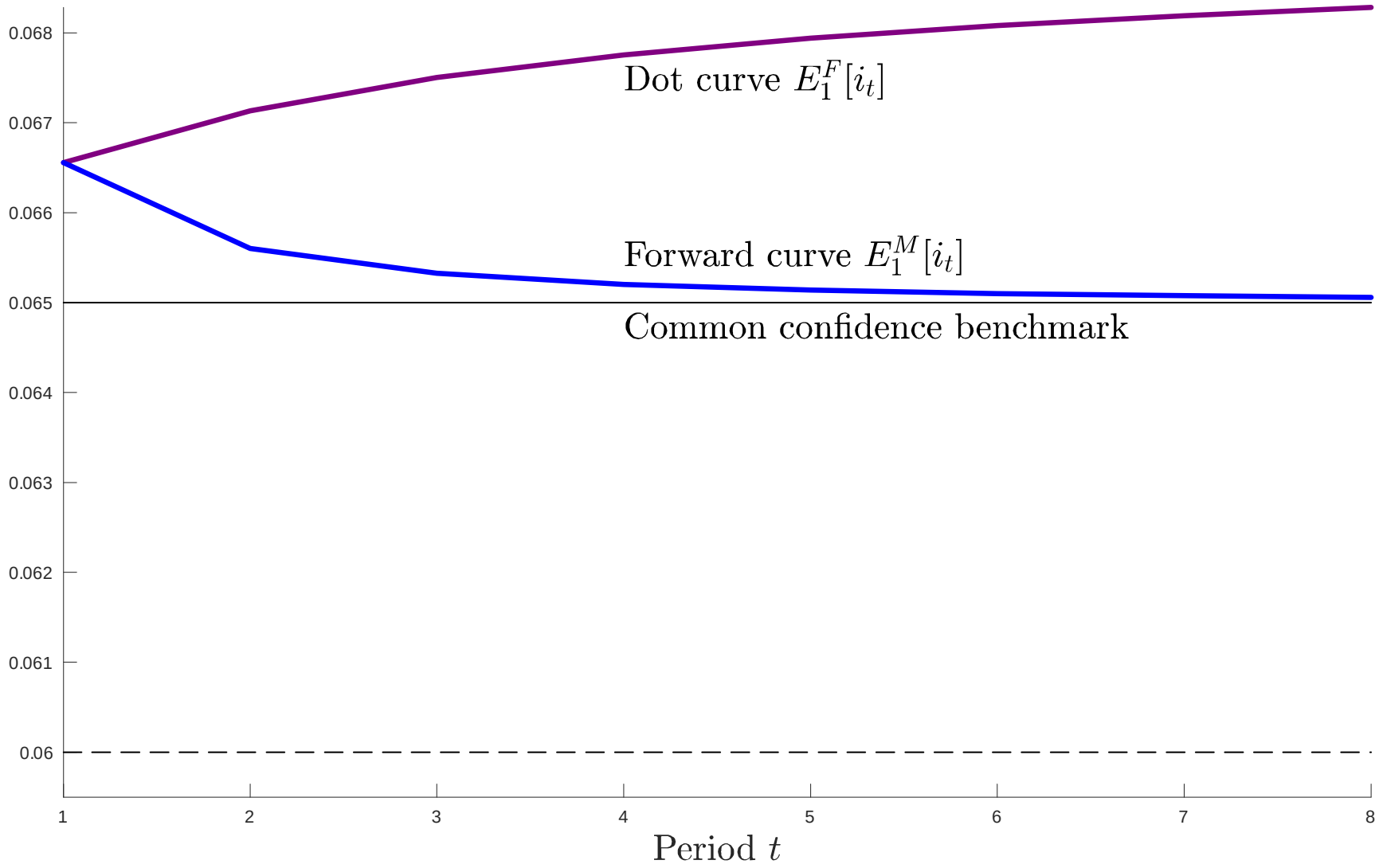
$$\tilde{y}_t = \mathbf{D_t}\left(g_t - E_t^F[g_t]\right)$$

where

$$\underbrace{\mathbf{D_t} < 1}_{\textbf{price impact is dampened}} \quad \text{iff} \quad \underbrace{C_0^F < C_0^M}_{\textbf{when Fed is more data sensitive}}$$

Data-sensitive Fed: Shocks are "absorbed more" by rates

Suppose Fed is more data-sensitive and initial shock positive $\Delta g_0 > 0$



Conclusion: Monetary policy with opinionated markets

Model with **opinionated disagreements** between markets and Fed:

- With learning, translates into **disagreements in expected rates**
- Disagreements affect current policy rate through **MP "mistakes"**
- Disagreements can break the **divine coincidence** between output and inflation stabilization

Extensions:

- Disagreement about signal: MP information or **"mistake" shock**
- Heterogeneous data sensitivity. **Shocks bundled w/ MP "mistakes"**