

# EXPERIMENTAL STUDY ON THE EFFECT OF NOMINAL PRICE LEVEL VERSUS INFLATION TARGETING WITH AND WITHOUT GUIDANCE

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## Motivation

- Recent economic crisis – **deflation and output contraction spiral**.
- Alternative policies to pull the economy from **ZLB** (Benhabib et al., 2001), and prevent it in the future:
  - **Price-level targeting** (PLT) – instead of inflation targeting;
  - **Guidance** – additional information about the policy of the CB (eg. interest rate path).
- Both policy measures are promising under Rational Expectations and Adaptive Learning (Mitra and Honkapohja, 2015)...
- ... but empirical market agents may be **less sophisticated** (Assenza et al., 2014).

## Agenda

- Goal:** study empirical efficiency of guidance and PLT.
- Method:** use laboratory experiment with human subjects.
- Experimental economy:** standard New Keynesian DSGE model with ZLB.
- Advantages:**
  - direct control over economy and information structure;
  - individual beliefs are observable (elicited by subjects);
  - subjects are actual consumers from the real macroeconomy.

## Research setup

- Learning-to-Forecast experiment with 6 subjects.
- We ask the subjects to repeatedly **forecast inflation** and **output gap** 2-period ahead.
- Subjects are paid for forecasting accuracy.
- Each subject knows his/her forecasts, realized inflation, output gap and interest rate, and the corresponding payoffs.
- Subjects **do not know** forecasts/payoffs of the other subjects.
- Subjects are given only a **qualitative description** of the economy

## Experimental economy

1. The aggregate consumption:

$$c_t = c_{t+1}^e \left( \frac{\pi_{t+1}^e}{\beta R_t} \right)^{1/\sigma} + \varepsilon_{ct}$$

2. The Phillips curve:

$$\pi_t = Q^{-1}[K(c_t, \pi_{t+1}^e)] + \varepsilon_{pt}$$

where  $Q(\pi_t) = (\pi_t - 1)\pi_t$  and

$$K(c_t, \pi_{t+1}^e) = \beta \pi_{t+1}^e (\pi_{t+1}^e - 1) + \frac{\nu}{\alpha \gamma} (c_t + \bar{g})^{(1+\varepsilon)/\alpha} + \frac{1-\nu}{\gamma} (c_t + \bar{g}) c_t^{-\sigma}$$

**Expectations:**  $\pi_{t+1}^e$  and  $c_{t+1}^e$  are based on the average subject forecasts of inflation and output gap.

## Experimental Taylor rule

$$R_t = 1 + \max \left\{ 0, \bar{R} - 1 + \psi_P \Psi_t + \psi_Y \frac{y_{t+1}^e - y^*}{y^*} \right\}$$

- $\Psi_t = \pi_{t+1}^e - \pi^*$  means inflation targeting → standard specification with  $\psi_P = 1.5$ ,  $\psi_Y = 1$ .
- $\Psi_t = \frac{P_{t+1}^e - \bar{P}_{t+1}}{P_{t+1}}$  means PLT → *how to choose parameters?*
- Under **naive expectations**, the system is stable only if  $\psi$  parameters are relatively *high* →  $\psi_P = 3$  and  $\psi_Y = 2$ .
- This is ‘unreasonably harsh’ under rational expectations or **adaptive learning** → Honkapohja and Mitra (2015) suggest  $\psi_Y = 1$  and  $\psi_P = 0.25$  (under guidance).

## Treatments

- Inflation targeting** → benchmark (link with other experiments).
- PLT:**  $2 \times 2$  design.

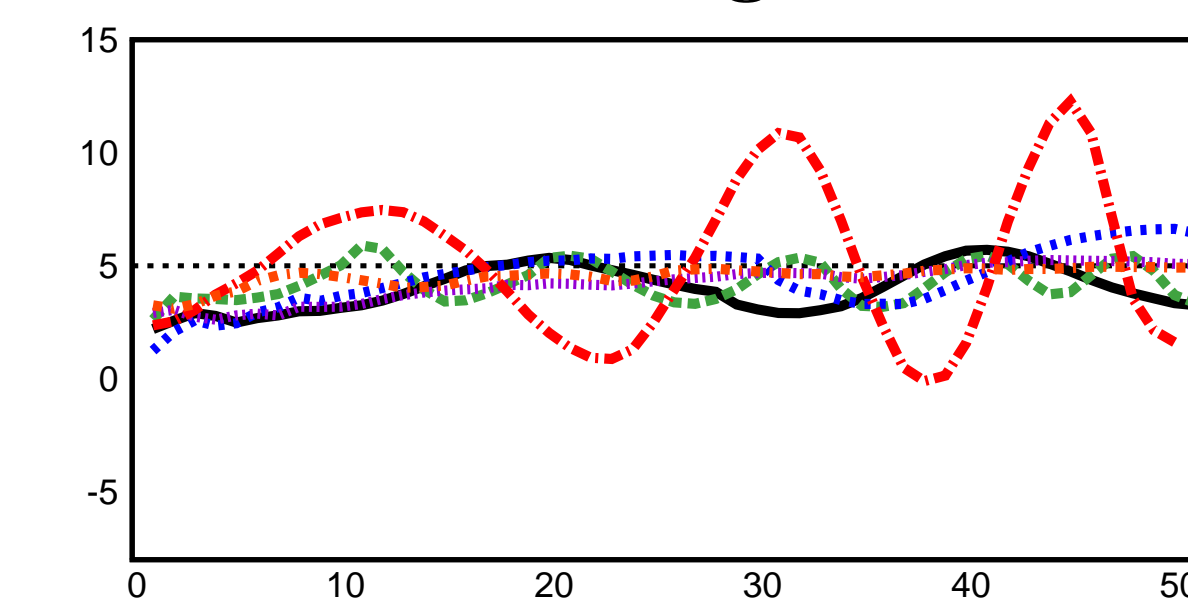
		Stability	
		Weak PLT rule	Strong PLT rule
Guidance	Taylor rule	Unstable/No g.	Stable/No g.
	PLT rule	Unstable/Guidance	Stable/Guidance

- Stability:** only strong rule is stable under *naive expectations*.
- Guidance:** subjects know about the PLT rule and know the realized values of  $\frac{P_{t+1}^e - \bar{P}_{t+1}}{P_{t+1}}$ .
- Without guidance, subjects do not know the exact value of the inflation/price level target (cf. Mitra and Honkapohja, 2015).

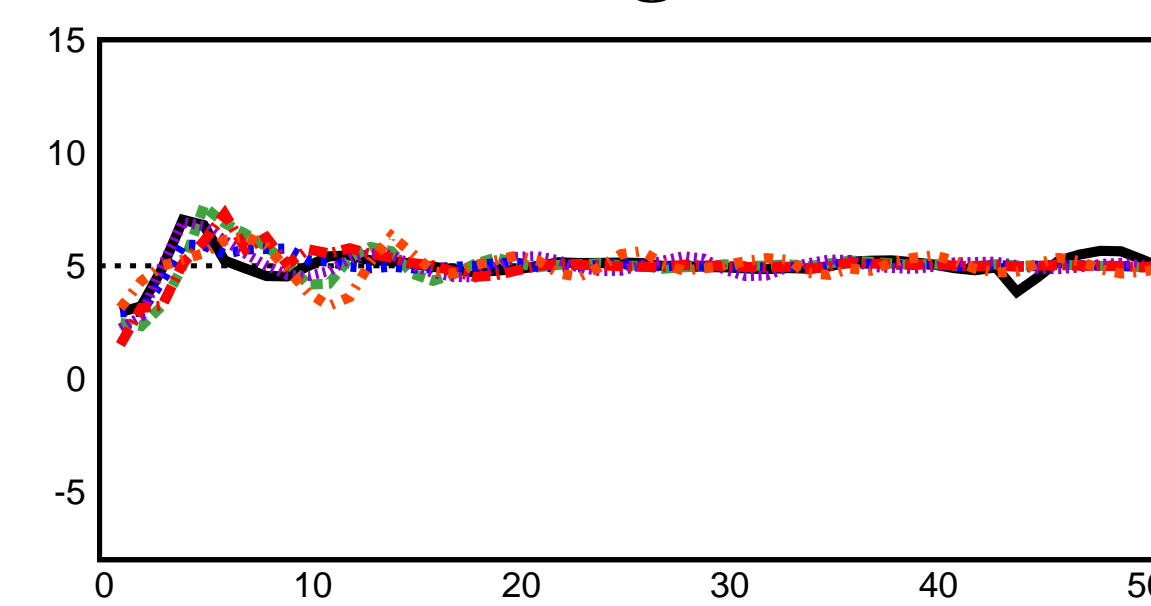
## Experimental results

• Experiment: **six groups per treatment**, in total 180 subjects.

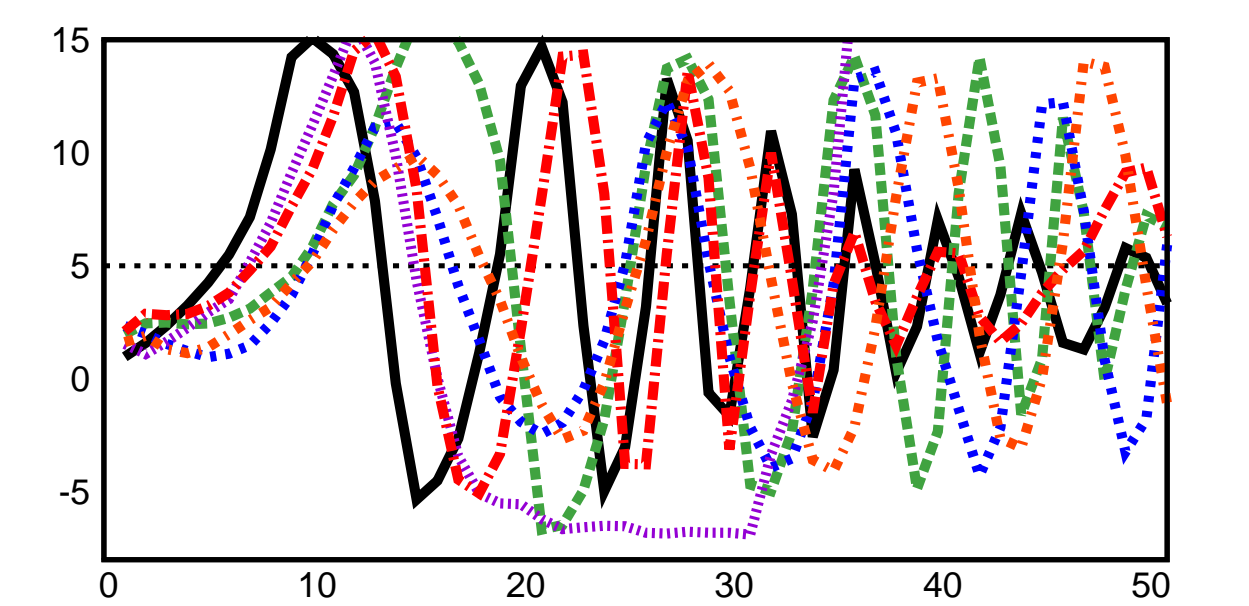
• **Inflation dynamics:**  
Inf. Target



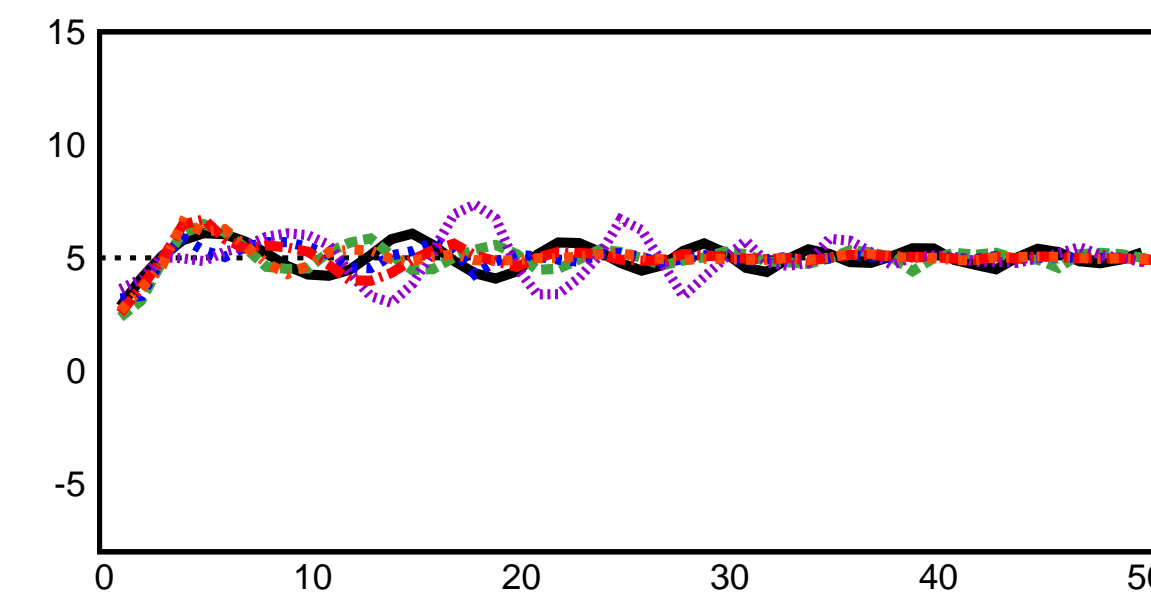
StrongNo



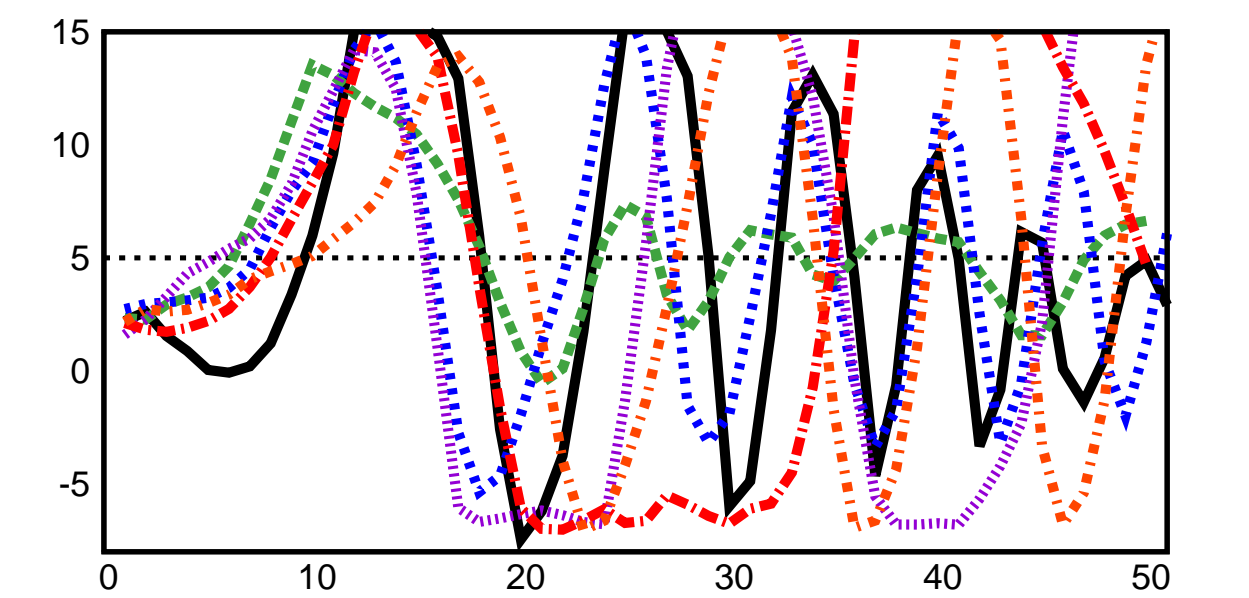
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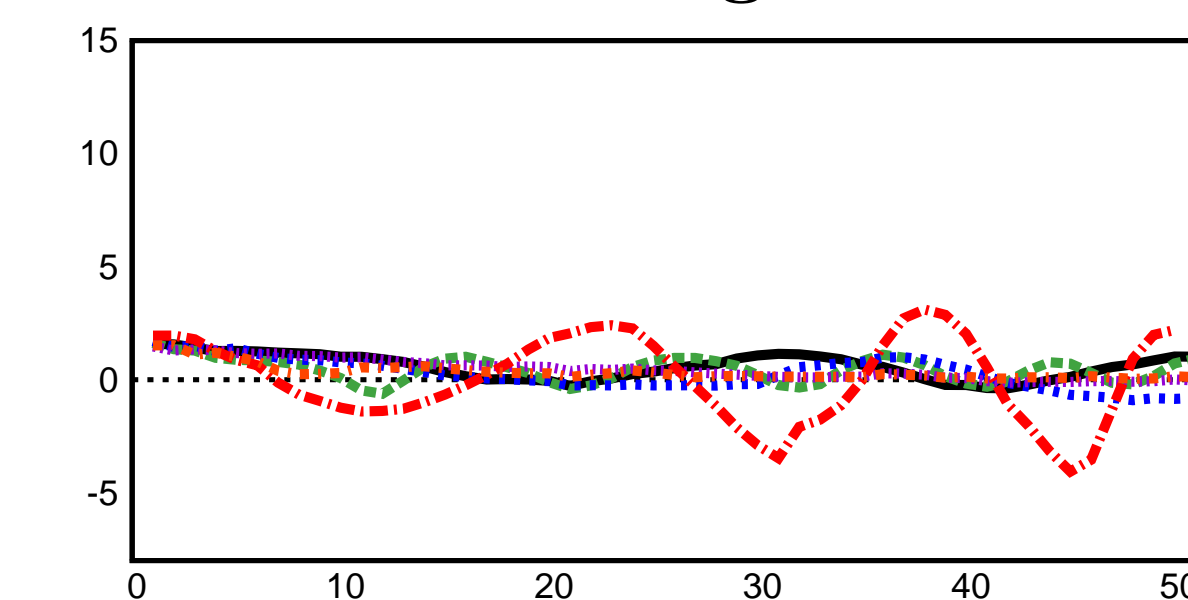
StrongGuidance



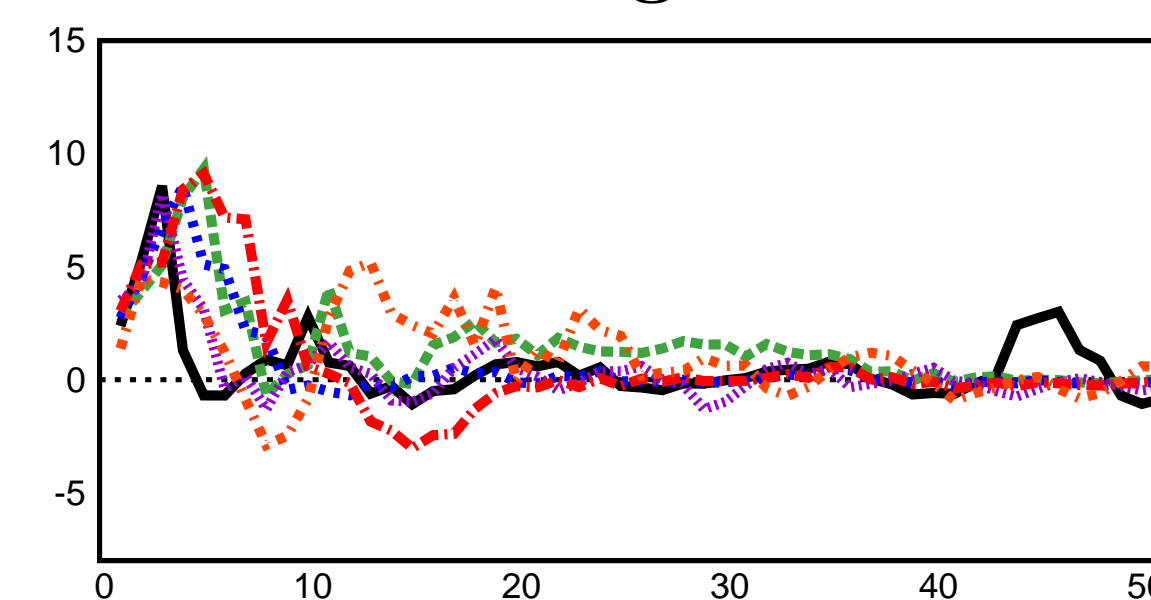
WeakGuidance



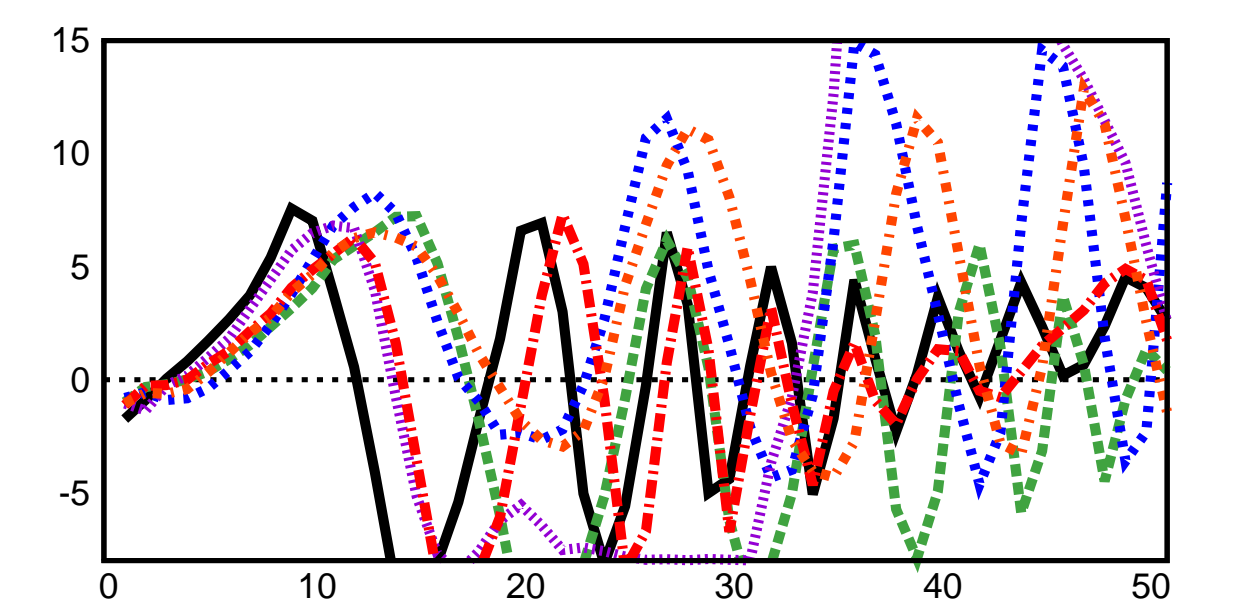
• **Output gap dynamics:**  
Inf. target



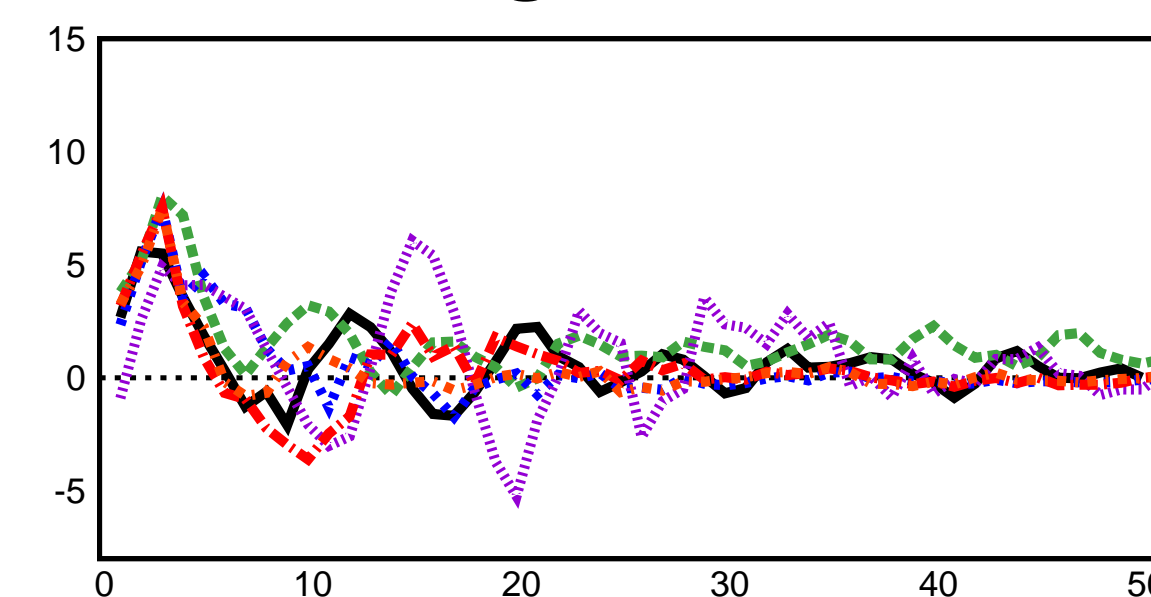
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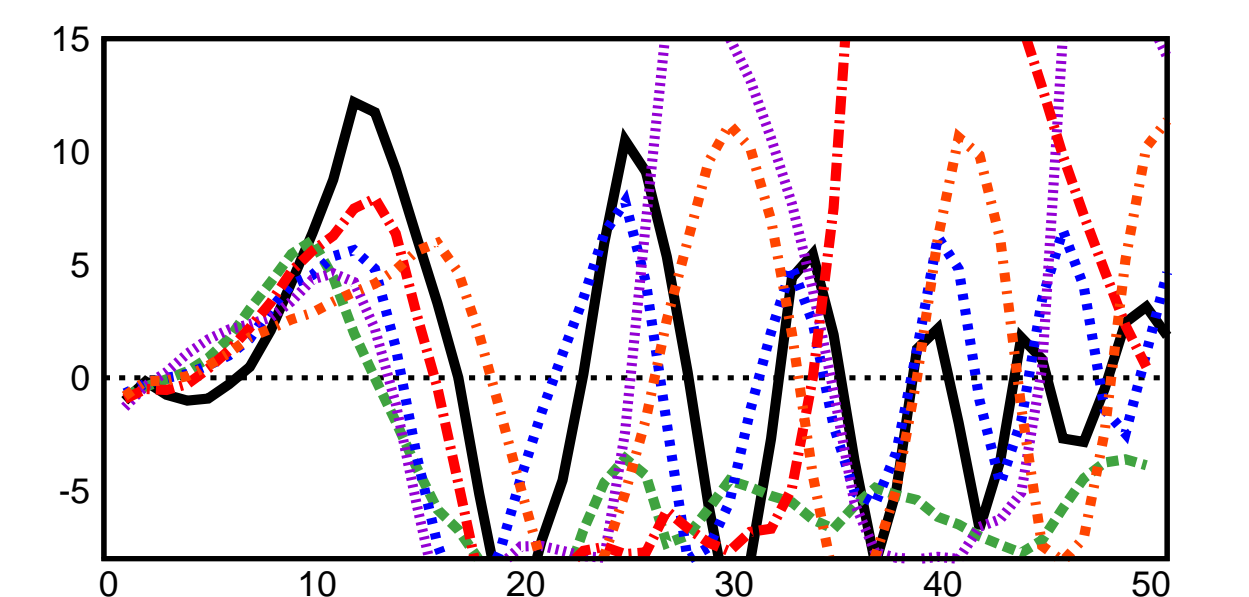
WeakNo



StrongGuidance



WeakGuidance



• **Rank-sum test** on Relative Absolute Deviation measures:

- Guidance **does not** have a significant stabilizing effect;
- Weak PLT rule much more **unstable**, Strong PLT and Inflation Targeting similar.

• **Individual behavior:** large heterogeneity, trend following, simpler rules in more stable environments, subjects ‘weakly’ use guidance and interest rate (not enough to converge under Weak PLT).

## Conclusions

- We run a simple macro-experiment on the role of simple **guidance and PLT**.
- Guidance has **weaker** effect on subjects than the Taylor rule.
- PLT has to be **harsh** to work effectively.
- Future extensions:** more information *via* guidance, links with theoretical work on behavioral expectations.