

Monetary Policy Frameworks away from the ELB

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Motivation

- Last reviews of monetary policy frameworks (MPFs) were motivated by
 - perceived decline of r^* \Rightarrow frequent occurrence of ELB
 - flattening of the Phillips curve \Rightarrow labor market overheating less likely to trigger inflation

Some frameworks were reviewed to provide greater monetary accommodation

- The frameworks were immediately put to the test
 - sequence of unforeseen supply shortages and pent-up demand
 - pressure for de-anchoring of inflation expectations on the upside
- How did they perform?
- What lessons to draw for next round of reviews?

Highlights of 2020/21 MPF reviews

- Fed review in August 2020
 - Adoption of flexible average inflation targeting
 - Focus on shortfalls (rather than deviations) of employment from max level
- BOJ review in March 2021 (new review ongoing)
 - Removed ETF target, slightly widened band on 10y JGB yields, scheme to promote lending
- ECB review in July 2021
 - Adoption of symmetric inflation target around 2%
 - Call for forceful monetary stimulus at ELB that may imply transitory overshooting
- BOC review in December 2021
 - Continuity with flexible inflation targeting within 1 to 3 percent range
 - Acknowledgement of greater uncertainty about max employment

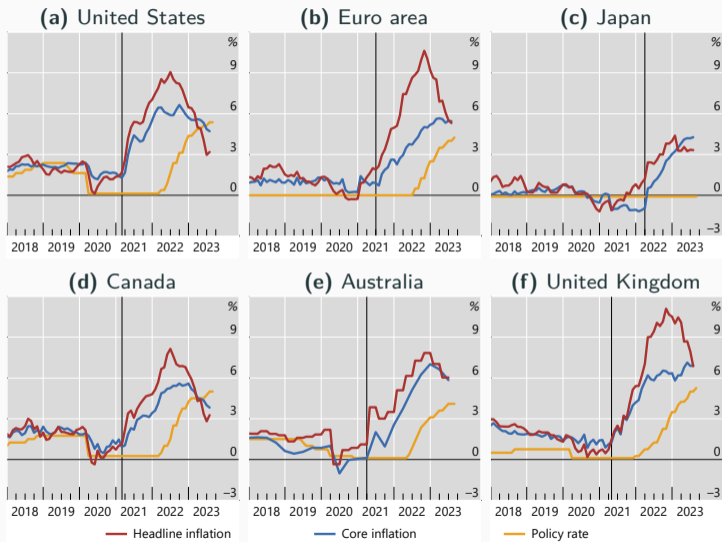
More recent and upcoming reviews

- RBA review in March 2023
 - Formalization of dual mandate
- BOJ ongoing
 - Focus on the effectiveness and side effects of UMP tools
- BOE ongoing
 - Limited to design and use of forecasts
- Fed, ECB and BoC expected every 5 years

From the reviews to high inflation

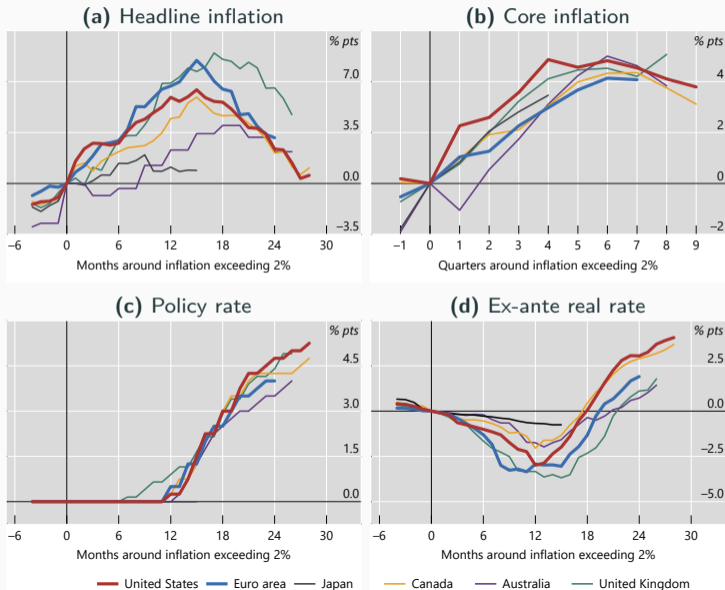
Rise in inflation and monetary policy tightening

- Black line: quarter when inflation rises above 2%
- Highly synchronised inflation surge
- Larger discrepancy between headline and core for larger net energy importers (EA and UK but not JP)
- Lift-off well beyond the initial rise in inflation for all 6 economies



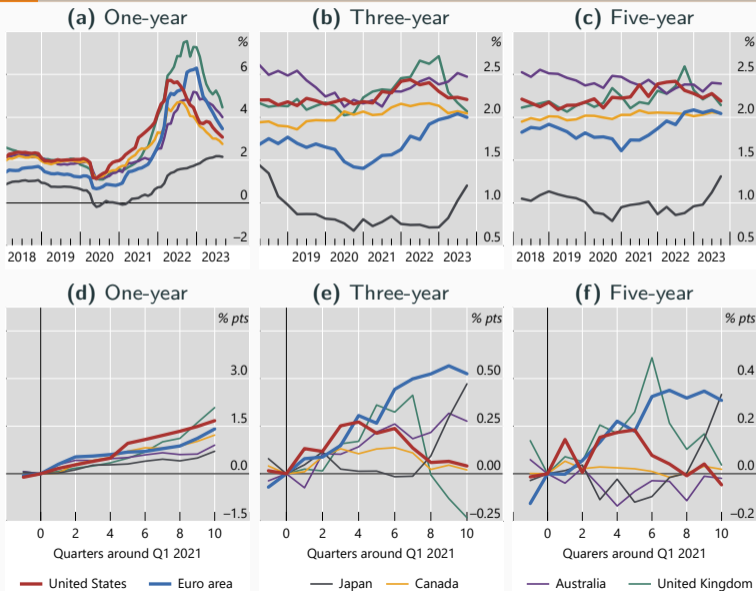
Timeline across countries

- Highest increase in headline inflation in EA and UK
- Highly synchronized increase in core inflation
- Negative ex-ante real rates for at least 4 quarters in all countries



Inflation expectations

- 1-yr ahead inflation expectations closely followed realized inflation
- Similar dynamics in 3- and 5 yrs ahead inflation expectations
- 5-yrs inflation expectations largely stable; convergence back to target from below for EA and JP



Questions

1. Were the monetary policy frameworks successful in keeping inflation expectations anchored throughout the period of rising inflation?
2. What role did the frameworks play during the inflation surge?
3. Looking ahead, how would they perform under a steeper Phillips curve or a higher natural rate of interest?

1. MPFs and the anchoring of inflation expectations

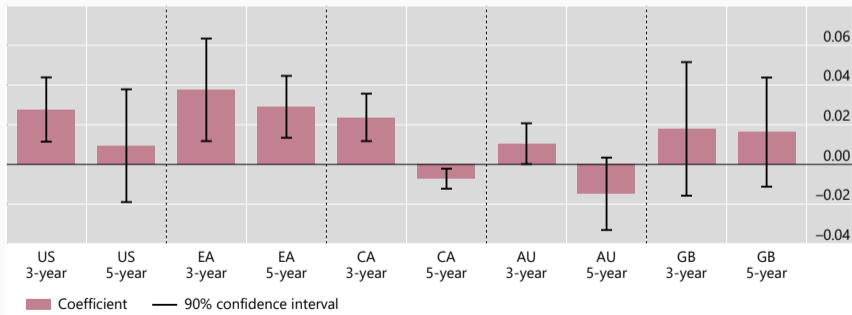
Anchoring of inflation expectations during the inflation surge

Question: Did central banks that revised their MPF to provide greater accommodation (Fed and ECB) experience stronger de-anchoring during the inflation surge?

Regression:

$$\pi_t^E = \alpha + \beta\pi_t + \epsilon_t$$

Estimates of β over the period since inflation exceeds 2%: mild evidence of stronger de-anchoring in the EA



Anchoring of inflation expectations around the MPF reviews

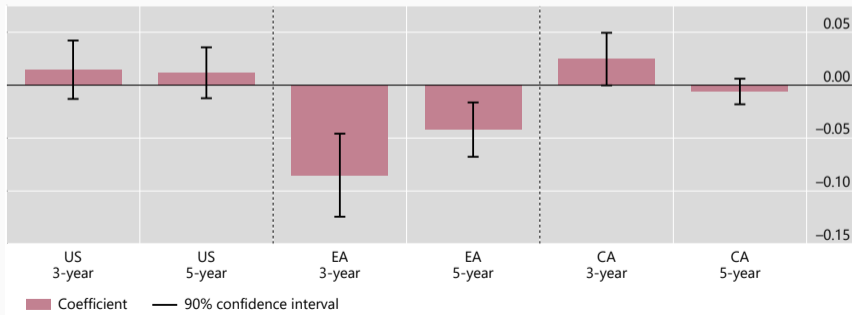
Question: Do we see changes in the anchoring of inflation expectations before and after the MPF reviews?

Regression:

$$\pi_t^E = \alpha + (\beta + \gamma * T_{MPF}) \pi_t + \epsilon_t$$

where T_{MPF} is a dummy taking value 1 after each country's MPF reviews

Estimates of γ over
2003Q1-2023Q2:
some evidence of
improved anchoring in
EA after MPF review



2. Role of MPFs during the recent inflation surge

The New-York Fed model

- What role would alternative monetary policy (MP) rules have played during the inflation surge?
- What role would they have played in an economy with below-target and stable inflation?
- Answer through the lenses of a medium-scale DSGE model for the US used for policy analysis at the NY Fed (Del Negro et al., 2013, and Cai et al., 2021)
 - one sector growth model
 - price and wage rigidities
 - financial frictions
 - variable capital utilization and adjustment costs in investment
 - habit formation in consumption
 - MP follows a Taylor rule, forward guidance via anticipated policy shocks
 - government sets spending and raises lump-sum taxes

Estimation and simulations under alternative MP rules

- Model estimation for the period 1964Q1-2019Q4.
- Estimated MP rule: $R_t = 0.85R_{t-1} + (1 - 0.85) [1.6 (\pi_t - \pi^*) + 0.02 (y_t - y_t^f)]$
- Using data on observables for 2019Q4 to 2023Q1, shocks are backed up
- Model simulations under alternative MP rules

1. Inflation targeting (IT):

$$R_t = 0.85R_{t-1} + (1 - 0.85) [\phi_\pi(\pi_t - \pi_t^*) + \phi_y(y_t - y_t^f)]$$

2. Average inflation targeting (AIT):

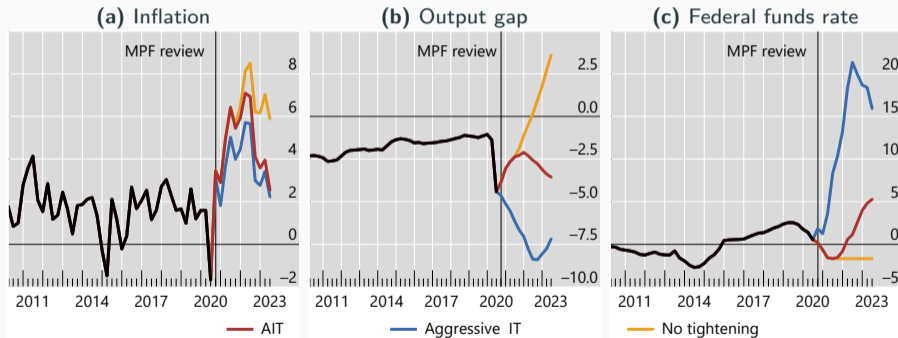
$$R_t = 0.85R_{t-1} + (1 - 0.85) \left[\phi_\pi \left(\frac{1}{16} \sum_{i=1}^{16} \pi_{t-i+1} - \pi^* \right) + \phi_y(y_t - y_t^f) \right]$$

3. Forward guidance: R_t is kept at zero for a given number of periods before following the IT rule

Alternative MP rules during the inflation surge

AIT: $\phi_\pi = 1, \phi_y = 0$. Aggressive IT: $\phi_\pi = 10, \phi_y = 0$. No tightening: R_t constant until 2023Q3

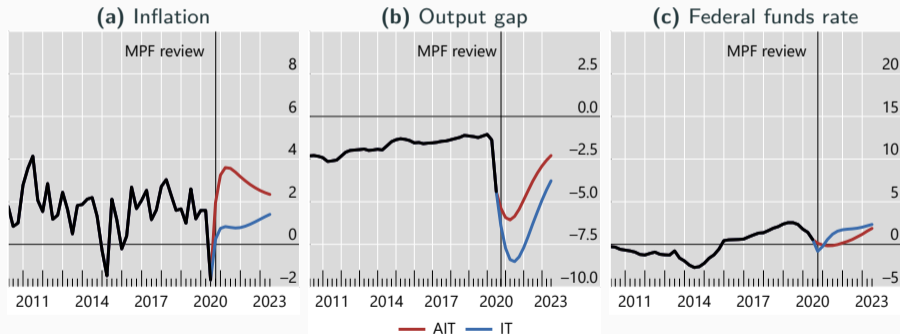
- Relative to AIT (red), an aggressive IT rule (blue) only mildly mitigates inflation at the cost of a larger negative output gap
- If policy is not tightened (yellow), inflation is higher and takes much longer to revert to target



Alternative MP rules in a low and stable inflation environment

AIT: $\phi_\pi = 1, \phi_y = 0$. IT: estimated rule with $\phi_\pi = 1.6, \phi_y = 0.02$.

- AIT (red) raises rates more gradually and persistently than IT (blue) to make up for low inflation over previous 4 years
- This generates an intended inflation overshooting and a milder output gap



3. MPFs in an environment of steeper Phillips curve or higher r^*

Single vs dual mandate and the slope of the Phillips curve

- Do the benefits of moving from a single to a dual mandate depend on the slope of the Phillips curve (PC) or on the specific MP rule?
- Simulate the estimated model after repeatedly drawing the shocks
- Compute the time- t welfare loss using the functional form

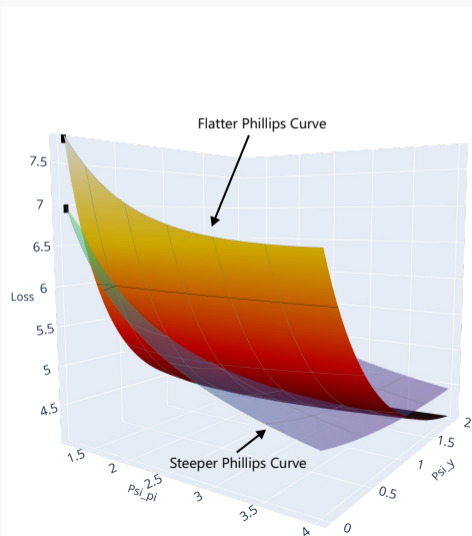
$$L_t = (\pi_t - \pi^*)^2 + (y_t - y_t^f)^2 + 0.5 (R_t - R_t^f)^2$$

- Compute the loss under AIT for different ϕ_π and ϕ_y with a flat PC
- Compare the loss under AIT when the PC is steeper
- Repeat the same exercise under IT

Welfare under AIT and the slope of the PC

- Flat PC (red): higher response to inflation does not change much the loss. More aggressive reaction to output does.
- Steep PC (purple): largest loss reduction arises from increasing response to inflation. Higher reaction to output is largely irrelevant.
- Move to a dual mandate is welfare improving in a low and stable inflationary environment.
- Evidence that the Phillips curve has steepened (Cerrato and Gitti, 2022)

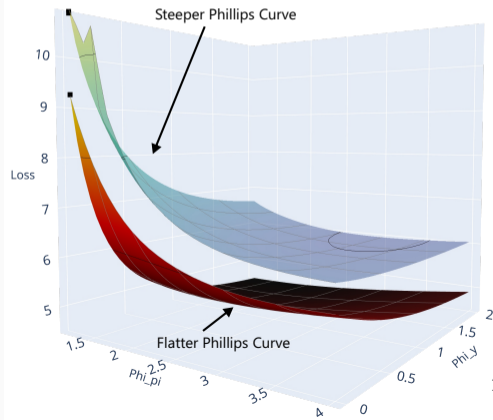
(a) Average inflation targeting



Welfare under IT and the slope of the PC

- Similar implications for dual mandate under IT.
- Loss surface moves down under IT when PC is flat (red), not always under AIT. Reason is that AIT may force larger output volatility.
- When PC is flat, there are more limited gains from higher output reaction under IT.

(a) Inflation targeting



Welfare under AIT vs IT: the role of r^*

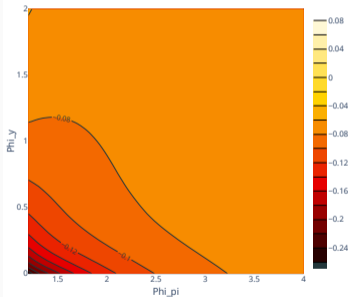
- Does AIT improve welfare relative to IT also for higher levels of r^* ?
- Do the benefits arise in terms of inflation, output or interest rate volatility?
- Compute the difference in volatilities under AIT and IT, for each combination of the reaction coefficients

Change in macroeconomic volatilities under AIT relative to IT – low r^*

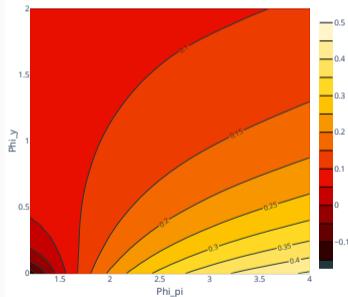
- At low r^* , AIT reduces inflation and interest rate volatility but increases output volatility

Differences in volatilities under AIT relative to IT

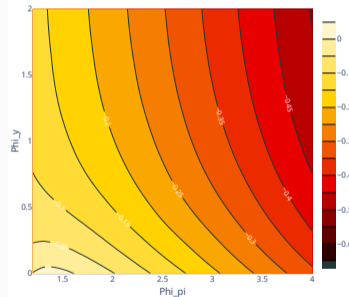
(a) Inflation



(b) Output gap



(c) Policy rate

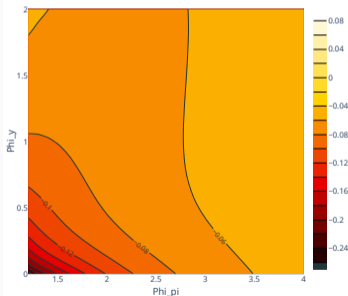


Change in macroeconomic volatilities under AIT relative to IT – high r^*

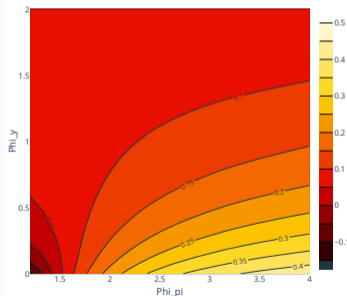
- A higher r^* reduces the incidence of the ELB
 - Smaller differences between AIT and IT in output and inflation volatilities
 - AIT continues to better stabilize interest rates

Differences in volatilities under AIT relative to IT

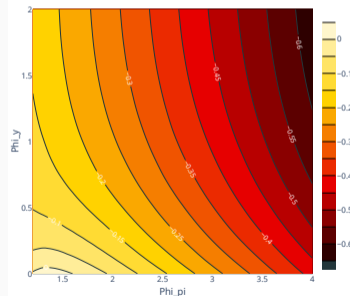
(a) Inflation



(b) Output gap



(c) Policy rate



Main takeaways

- Last MPF reviews tailored to an environment of low inflation and tight ELB constraint
- Yet, they performed relatively well during the period of unforeseen shocks and rising inflation, keeping inflation expectations anchored
- IT vs AIT would not have prevented the surge in inflation but tightening was key to ensure disinflation back to target
- Welfare benefits from a dual mandate arise when inflation is not reactive to the output gap, less so if the Phillips curve steepens.
- With higher r^* , welfare gains from AIT fall in terms of inflation and output volatilities but remain in terms of interest rate volatility.

References

Cai, M., Del Negro, M., Herbst, E., Matlin, E., Sarfati, R., and F. Schorfede. 2021. *Online Estimation of DSGE Models*. The Econometrics Journal.

Cerrato, A. and G. Gitti. 2022. *Inflation Since COVID: Demand or Supply*. Graduate Student Bravo Working Paper 2022-005.

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