

Monetary Policy Strategies for the ECB

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What We Do

- We consider the **consequences of low steady state real and nominal rates** for the EA economy, and different monetary policy strategies to deal with it.
- Start out by assessing the implications of a **symmetric/asymmetric policy regime** in an estimated workhorse macro model of the EA **with a binding ELB constraint**.
 - Long-sample artificial data generated through stochastic simulations (unconditional distributions).
- Second, we use the model to analyze how some **UMP** tools can improve the unconditional and conditional distributions.
 - NIRP (negative ELB)
 - Forward guidance (FG)/“Lower for longer” policy
 - Large Scale Asset purchases (LSAPs).

What We Do (Cont.)

- Next, we use the estimated model to analyze the merits of **alternative monetary policy strategies**:
 - **Average inflation targeting** (permanent or only if ELB binds)
 - **Price level targeting**
- **Macroeconomic model**: Use variant of the Smets and Wouters (2007, AER), which itself builds on Christiano et al. (2006, JPE).
 - Estimate model on Euro Area data (1985Q1-2019Q4).
- **Address the FG puzzle** by allowing for deviations from rational expectations (RE) in the spirit of Gabaix (2019).
 - Compare findings with RE model for different policy options.

Contribution to Existing Literature

- We add to the papers by Bernanke et al. (2019), Coenen et al (2019), and Andrade et al. (2020) by:
 - Analyzing policy options in an estimated DSGE model which addresses the **forward guidance puzzle**.
- Assess the macroeconomic implications of the ECB's shift from an **asymmetric** towards a **symmetric** approach wrt inflation:
 - Pre-GFC, the ECB focused on keeping inflation contained, and followed an asymmetric reaction function that implied a stronger response to high inflation than to low inflation.
 - Strategy confirmed in May 2003 ECB strategy review: *ECB will “aim to maintain inflation rates below, but close to, 2% over the medium term”*.
 - ECB has progressively moved towards symmetry in recent years and formalized symmetry in its Strategy Review which concluded last week (July 8).

Some Key Findings

- Our **unconditional simulation results** suggest that:
 1. A **symmetric strategy** is beneficial in boosting the mean level of output and keeping inflation close to target on average.
 2. The high mean output costs of an asymmetric strategy can't be offset by UMP.
 3. Permanent **AIT/PLT strategies** associated with substantially higher output volatility given the flat Phillips curve and prominent role for cost-push shocks.
- Our **conditional simulation results** for a deep recession suggest:
 1. Important to drop **output growth response in rule** (focus on gaps)
 2. NIRP and FG over the shadow rate speeds recovery, **but by much less in the BR than RE model** (state contingent asset purchases are crucial in the BR model)
 3. Temporary AIT/PLT strategies modestly strengthen the pace of recovery in the BR model and boost inflation, again by considerably less than in RE.

Remainder of Presentation

- **Outline and key properties of estimated model.**
- **Benefits of symmetric strategy and UMP tools:**
 - **Effects of unconditional distributions.**
 - **Effects on conditional distributions.**
- **Benefits of new frameworks**
 - **Effects of unconditional distributions.**
 - **Effects on conditional distributions.**
- **Robustness analysis.**
- **Conclusions and future work.**

Outline of Benchmark Model

- Smets and Wouters (2007) multi-shock variant of the CEE (2005) model designed to have a realistic MTM:
 - **Sticky prices and wages** due to Calvo-style frictions (monopolistic competition).
 - **Real Rigidities** (Habit formation and investment adjustment costs).
 - **Variable capital utilization, fixed costs of production.**
- **Seven shocks:** technology (**a**), investment-specific (**q**), risk-premium (**b**), government spending (**g**), price (**p**) and wage markups (**w**), and monetary policy (**m**).
 - **Out of these seven shocks, the first four** affect flex-price-wage (potential) allocations.

Outline of Benchmark Model (Cont.)

- Modelling of deviations from RE follows the spirit of the behavioral approach in Gabaix (2019):

$$E_t^{BR} X_{t+1} = \varphi E_t X_{t+1}.$$

- Baseline BR model features deviations from RE for households; we maintain RE assumption for firms and labor unions.
 - Estimate household behavioral parameter φ^h to 0.95. Gabaix (2019) use 0.85.
 - Consider full BR model in robustness analysis (φ^f estimated to be 0.95 as well).
 - **Steady state unaffected.**
- Posterior odds favors BR model relative to RE model conditional on SS with low real rate (0.6 p.p. annualized).
 - LML for BR model (-472.6) > LML for RE model (-492.8)

Key Properties of Estimated Model

- Assess properties of behavioral model in some detail, relating to variant with standard RE assumption.
- First, study **Phillips curves and variance decompositions**.
- Second, study **impulses to key shocks** in model.
- Third, study **potency of FG** in model.

Key Properties of Model: Variance Decompositions

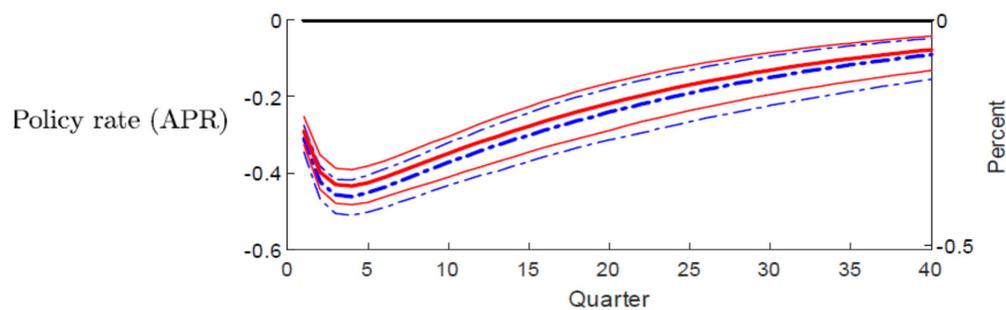
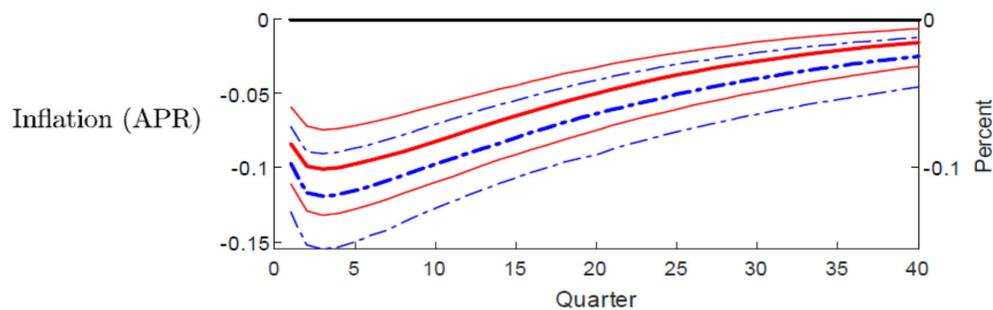
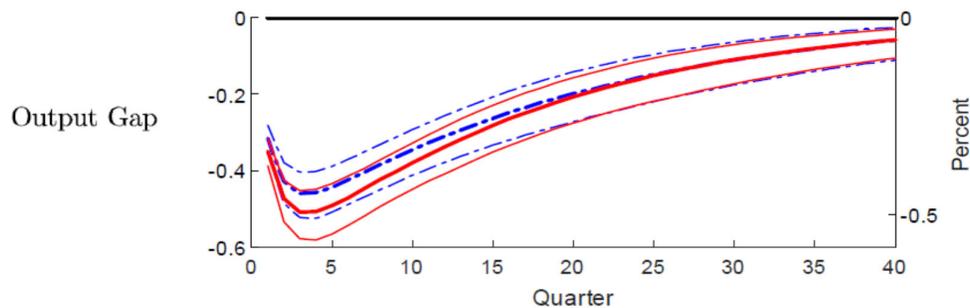
- **Estimated pricing Phillips curve slopes low (in line with NAWN II).**
 - Low sensitivity of wages and prices to demand.
 - Price and wage markup shocks key driver of price inflation.
 - Risk-premium shocks key driver of output and policy rates.
 - **Implication: notable tradeoffs between stabilizing inflation and the output gap: following a positive inflation impulse the CB would have to accept sizeable effects on the output gap to stabilize inflation (but under rule, “looks through” it).**

VARIANCE DECOMPOSITION (in percent)

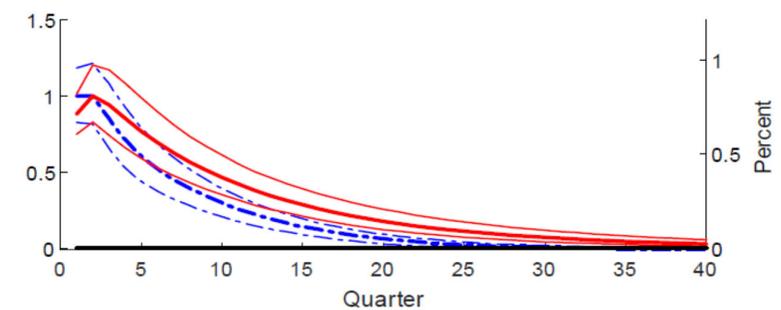
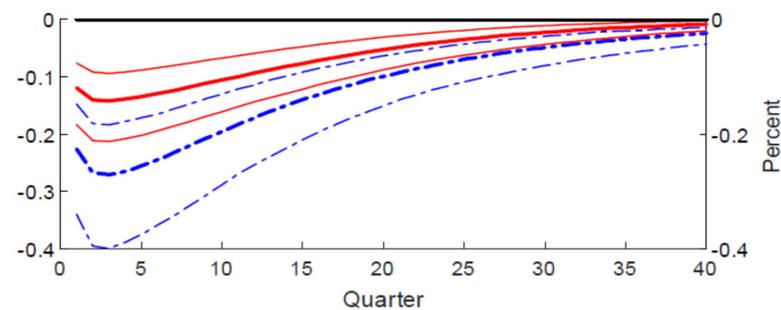
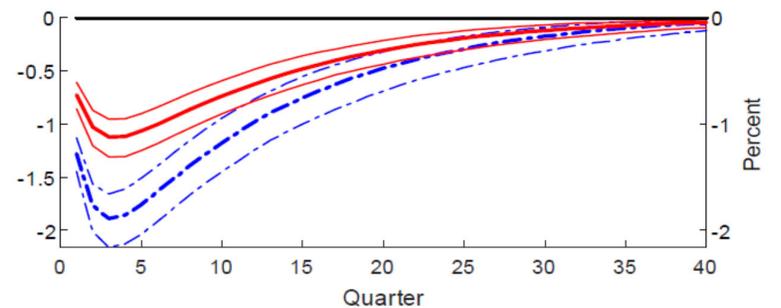
Variable	Technology	Risk	Gov. Exp.	Inv. Spec.	Mon. Pol.	Price Mkup	Wage Mkup
Policy rate	1.30	77.47	0.03	0.06	12.48	2.23	6.44
Output (dev from SS)	21.45	49.72	12.31	0.74	13.04	1.85	0.89
Output Gap	1.05	75.05	0.03	0.05	19.68	2.80	1.34
Output Growth (yoy%)	19.56	46.81	11.42	2.89	16.88	1.84	0.60
Inflation (yoy%)	0.44	16.34	0.01	0.01	1.65	56.22	25.32

Key Properties of Model: Impulse Responses

Risk Shock

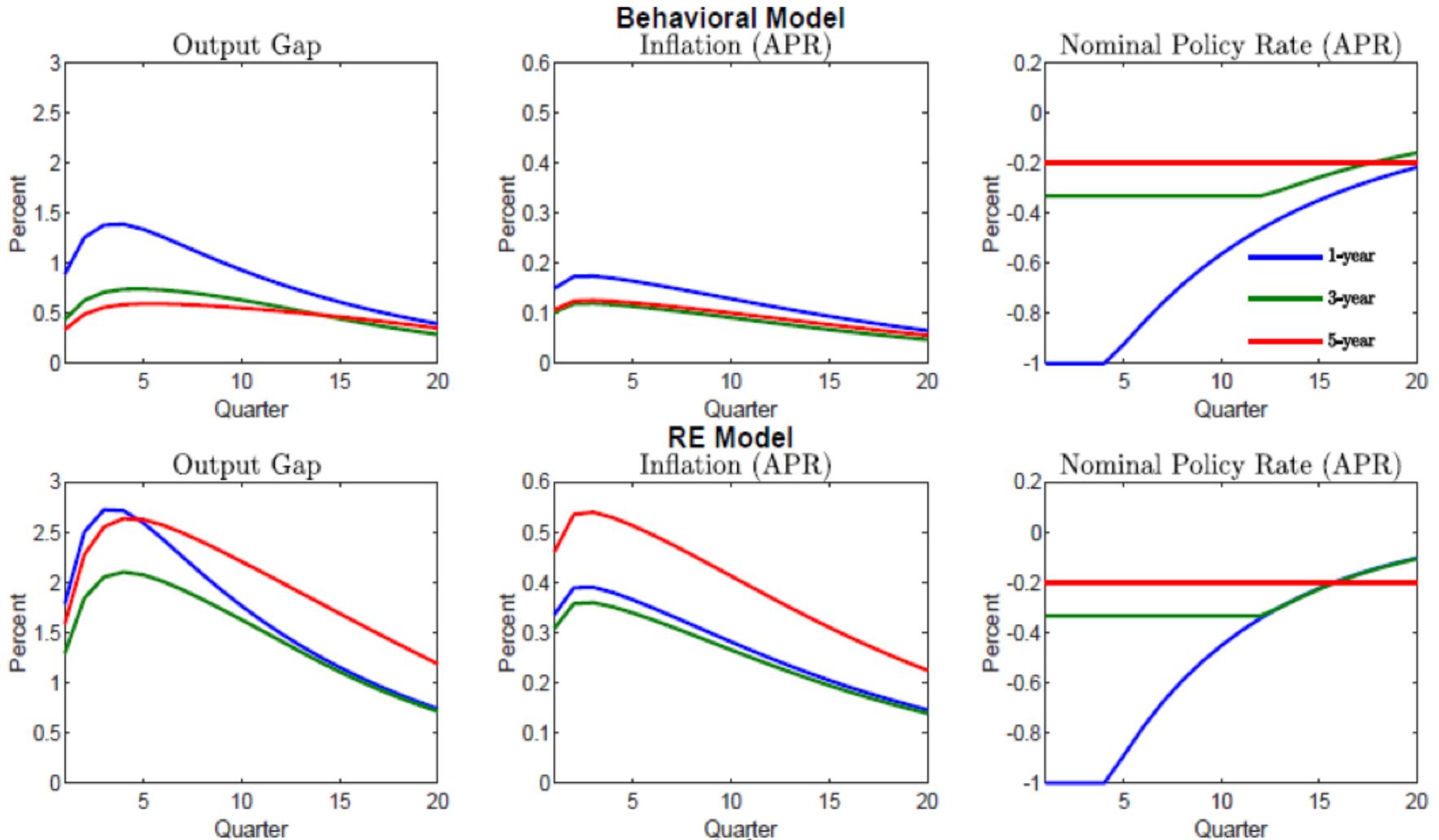


Monetary Policy Shock



--- RE Model, Median — Behavioral Model, Median
--- RE Model, 10%, 90% — Behavioral Model, 10%, 90%

Key Properties of Model: Forward Guidance



Benefits of a Symmetric Strategy

- Use the **estimated model to study** the merits of **symmetric and asymmetric strategies**, and how **UMP tools (NIRP, FG, and LSAPs)** can affect **unconditional and conditional distributions**.
 - Key steady state assumptions: steady state $i=2.6$, $\pi^*=2.0$, $\Delta y=1.2$
- Symmetric rule: estimated rule. Asymmetric rule assumes **ECB more aggressive when π_t is expected to be above π^*** :

$$i_t = \max\{ELB, i_t^*\}$$

$$i_t^* = (1 - \gamma_i)(i + \gamma_\pi(\pi_t - \pi^*) + \gamma_y x_t) + \gamma_{\Delta y} \Delta x_t + \gamma_\pi \max\{\bar{\pi}_{t+4|t} - \pi^*, 0\} + \gamma_i i_{t-1} + \varepsilon_{i,t}$$

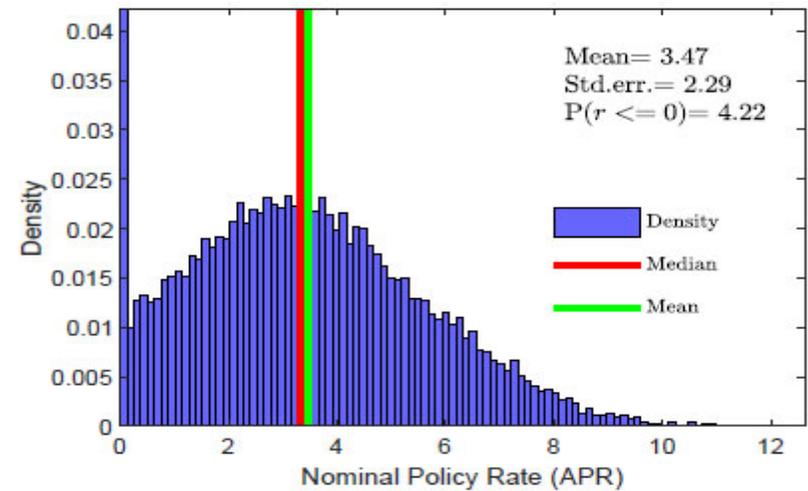
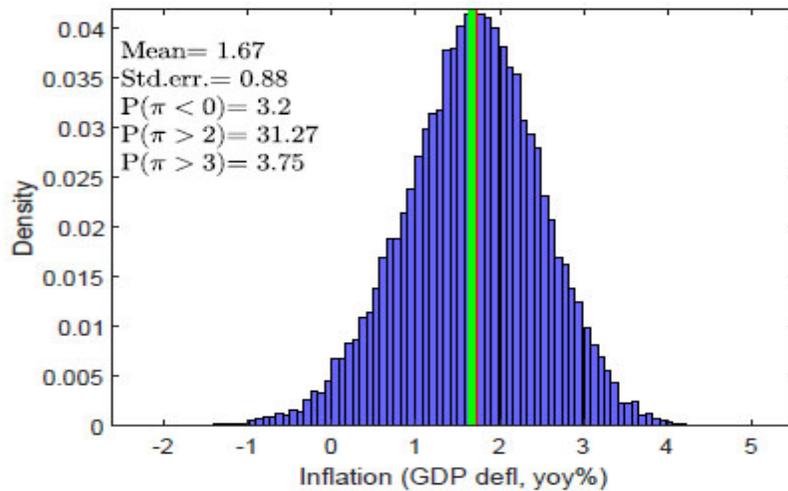
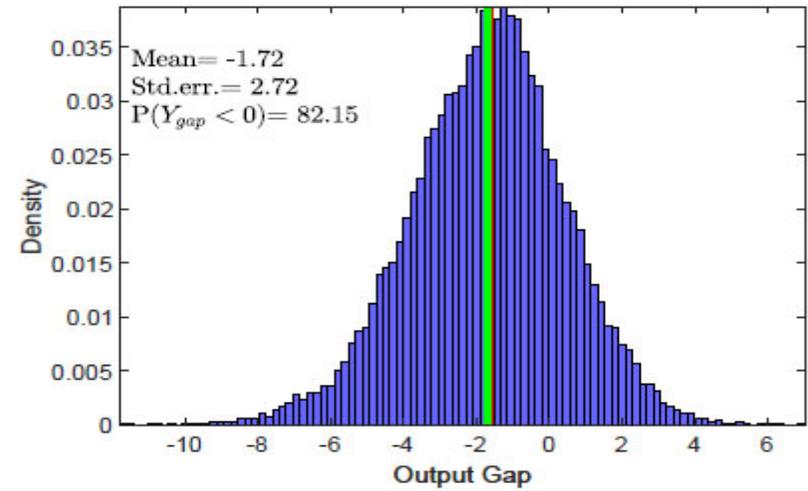
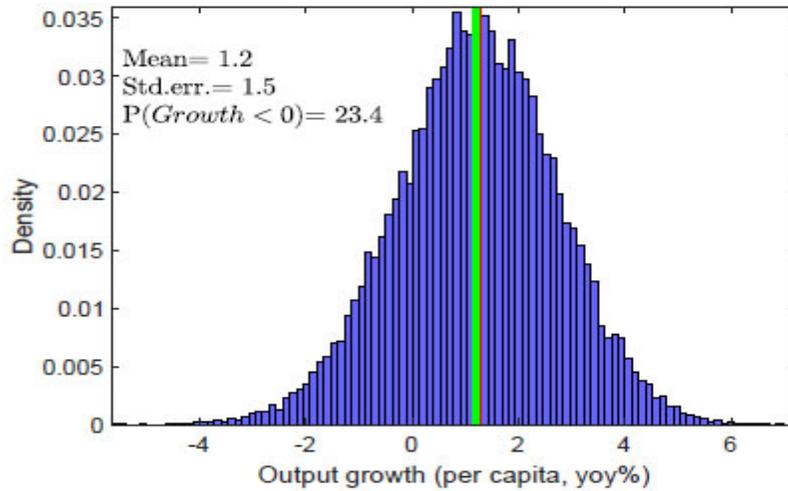
where $\bar{\pi}_{t+4|t} = (\pi_{t+4|t} + \pi_{t+3|t} + \pi_{t+2|t} + \pi_{t+1|t})/4$ and x_t the output gap.

- **Asymmetric term** added after estimation.
- Estimated parameters: $\gamma_i = 0.92$, $\gamma_\pi = 1.62$, $\gamma_x = 0.16$, $\gamma_{\Delta x} = 0.19$

Benefits of a Symmetric Strategy (Cont.)

- **When simulating the model, we subject the economy to exactly the same exogenous shocks, so all differences in outcomes are driven by policy.**
 - Use posterior mode (point estimates) to generate an artificial sample of 25,000 observations.
- **Report simulations results for both BR and RE models, allow separating out implications of deviating from RE.**

Unconditional Distributions: BR Model Asymmetric Rule



Unconditional Distributions for Alternative Rules

Table 5.1: Unconditional Distributions for Current Policy Regime.

Model Variant	Inflation		Inflation			Output Gap			Output Growth		Policy Rate			
	Mean	Std	$P(\pi \leq 0)$	$P(\pi > 2)$	$P(\pi > 3)$	Mean	Std	$M(x x \leq x^{5th})$	Mean	Std	Mean	Std	$P(R = 0)$	
Panel A: Baseline Behavioral Model														
Symmetric	1.96	0.95	2.09	48.53	13.71	-0.23	2.31	-5.46	1.2	1.46	2.71	1.71	4.47	
Asymmetric	1.67	0.88	2.52	35.09	4.74	-1.72	2.72	-6.37	1.2	1.5	3.47	2.29	3.40	
Panel B: RE Model														
Symmetric	1.91	1.04	3.66	47.50	14.12	-0.44	2.76	-7.74	1.20	1.60	2.67	1.72	4.99	
Asymmetric	1.56	0.99	4.47	31.82	4.00	-1.94	3.17	-8.31	1.20	1.69	2.88	1.83	4.68	

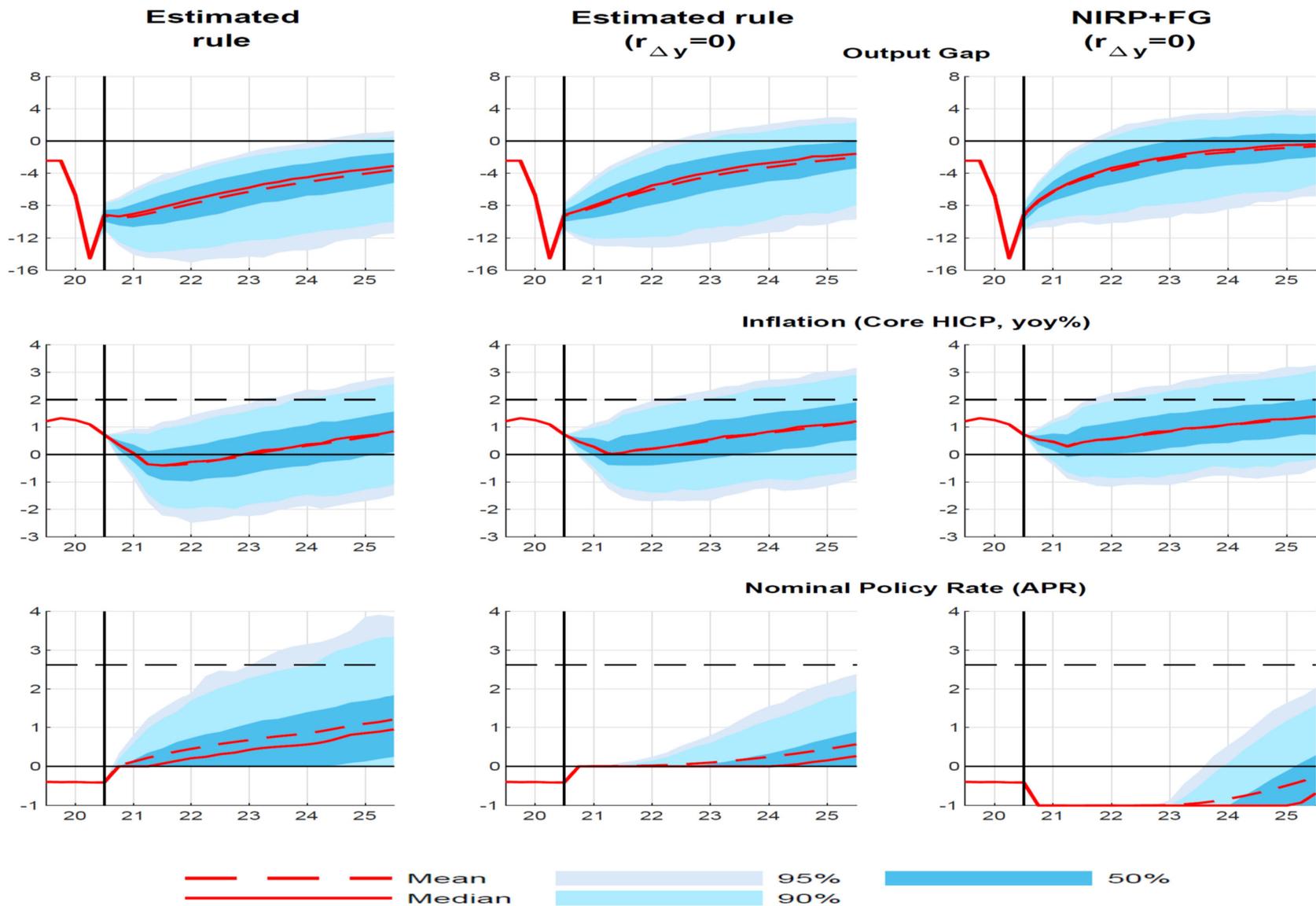
Note: All variables in the table are in annualized rates. Std is the standard deviation of the series computed based in the simulated sample with 25,000 observations. $M(x|x \leq x^{5th})$ is mean of the output gap series counting only observations below or equal its 5th percentile (which is contingent on each policy). Symmetric regime results in based on the estimated rule (5.1) with $\bar{r}_\pi = 0$ whereas the asymmetric rule sets $\bar{r}_\pi = r_\pi$.

- Key finding: Asymmetric rule limits upside inflation risk but generates large output cost and lower inflation.**
 - Negative stochastic mean for output gap (-1.72 percent) under asymmetric rule, reduced to -0.23 with symmetric rule.
 - Stochastic inflation mean more than ¼ percent below π^* with asymmetric rule.
 - **Results qualitatively similar but quantitatively elevated in RE model.**
 - Adverse effects of asymmetric rule can only be partially offset by UMP tools.

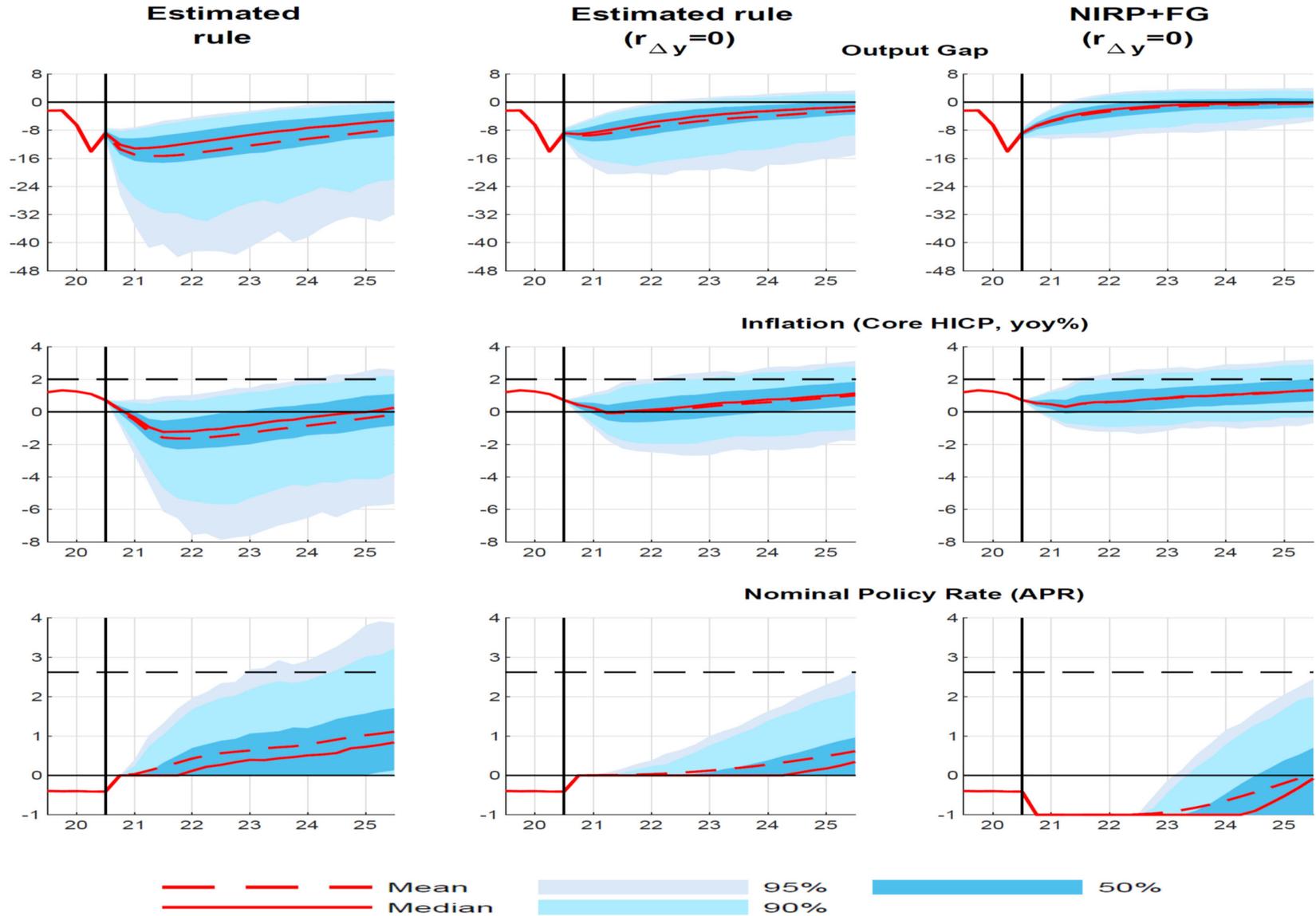
Effects of UMP on Conditional Distributions

- We now turn to study conditional distributions.
- The conditional distributions are contingent on data until 2020Q3, and then computing a dynamic forecast allowing for shock uncertainty 2020Q4-2025Q2. **Three key assumptions:**
 - Effective risk/term-premium 250 bps (informed by EA corporate spread data).
 - Shadow rate -4.60 percent (estimates using Wu and Xia, 2016, method).
 - Symmetric rule, no asymmetric component.
- Compare **forecast distributions conditional on these policies:**
 - **Estimated rule** with ZLB and no further UMP – “Estimated rule”.
 - **Setting $r_{\Delta y} = 0$** in the policy rule – “Estimated rule ($r_{\Delta y} = 0$)”
 - Adding **NIRP (-1%) +FG (smoothing over i_t^*)** – “NIRP+FG ($r_{\Delta y} = 0$)”.

Conditional Distributions Given State 2020Q3: Behavioural Model

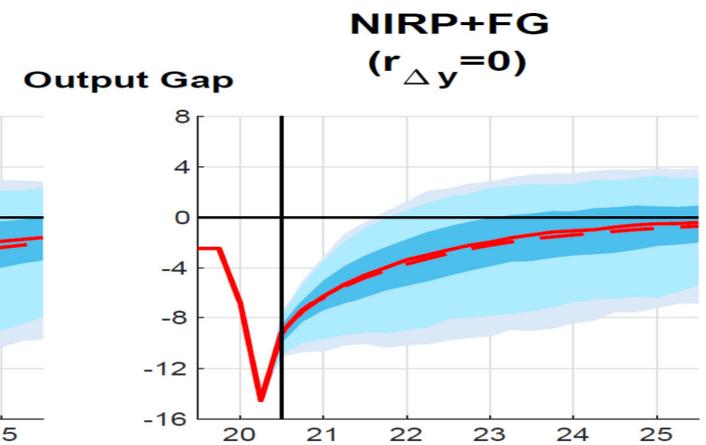
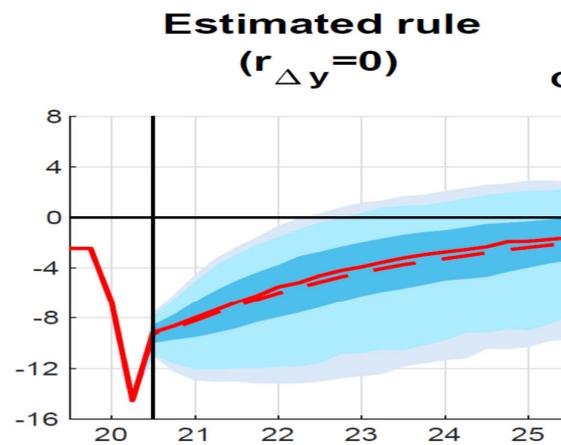
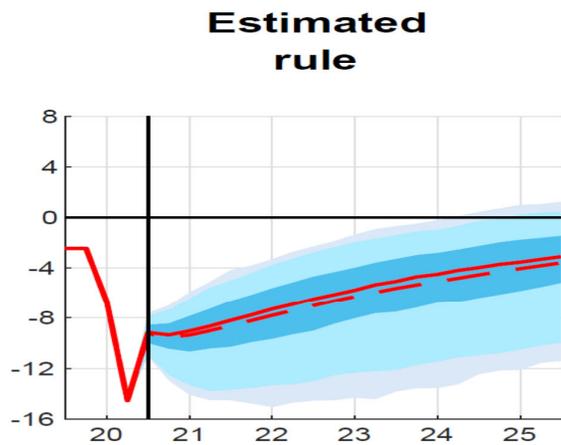


Conditional Distributions Given State 2020Q3: RE Model

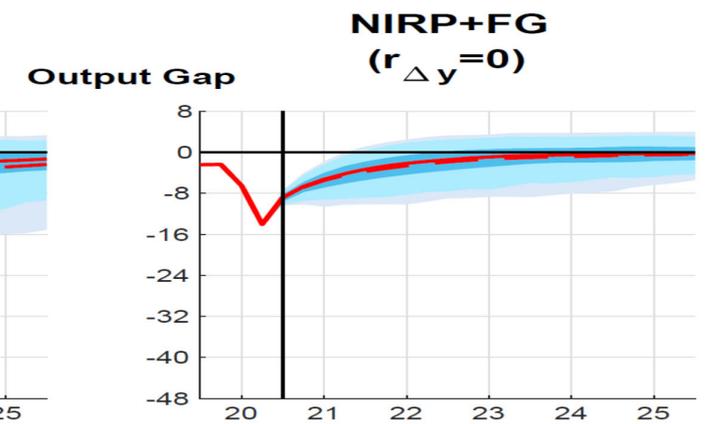
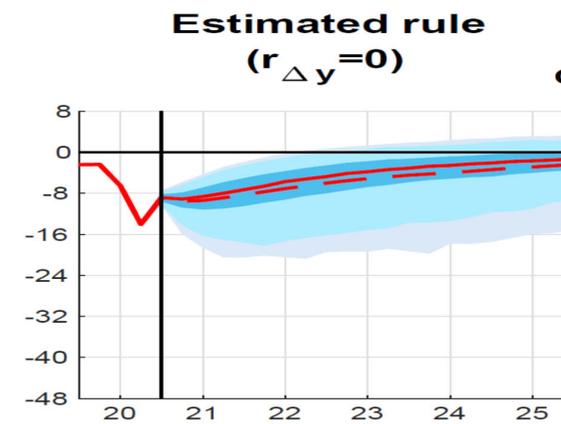
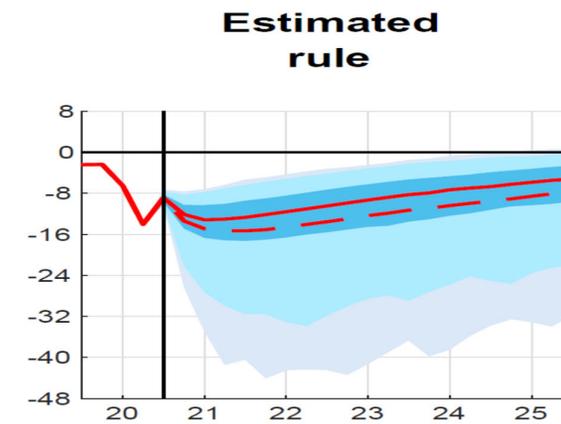


Comparing Conditional Output Gap Distributions

BR Model



RE Model



Benefits of New Frameworks

- We now turn to analyze the effects of alternative frameworks.
- **Average inflation targeting (AIT)** with symmetric rule, CB responds to $\bar{\pi}_t - \pi^* = \sum_s \pi_{t-s} - \pi^*$ where we set horizon $s = 0, \dots, 19$ (5 years).
 - Compare **temporary** (only when shadow rate $i_t^* < \text{ELB}$) **vs. permanent AIT regimes**.
 - AIT regimes with different AIT gap coefficients: $\gamma_{\pi}^{Est} = 1.62$ vs. $5\gamma_{\pi}^{Est}$
 - **Identical to estimated rule in all other respects unless explicitly noted.**
- **Price level targeting (PLT)**; like AIT but with horizon $s = 0, \dots, \infty$.
 - Compare **temporary** (only when shadow rate $i_t^* < \text{ELB}$) **vs. permanent PLT regimes**. Set PLT response coefficient equal to γ_{π}^{Est} .
- Table on next slide show unconditional distributions for the alternative policies when imposing the ZLB (no UMP tools deployed); **all contingent on same shocks so fully comparable.**

Benefits of New Frameworks: Unconditional Distributions

Table 6.1: Unconditional Distributions for Alternative Policy Regimes.

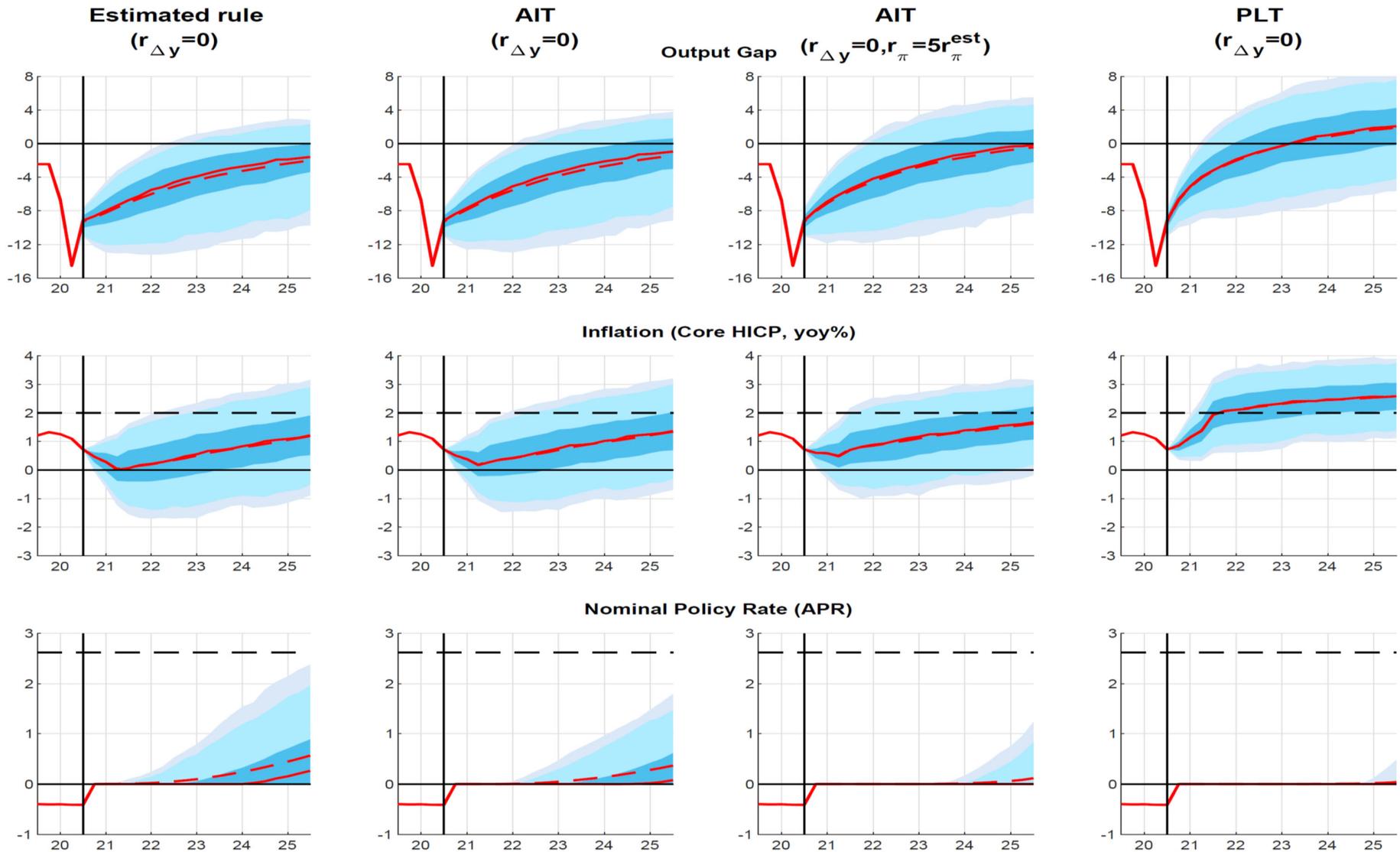
Policy Regime	Inflation					Output Gap			Output Growth		Policy Rate			
	Mean	Std	$P(\pi \leq 0)$	$P(\pi > 2)$	$P(\pi > 3)$	Mean	Std	$M(x x \leq x^{5th})$	Mean	Std	Mean	Std	$P(R \leq 0)$	
Panel A: Behavioral Model														
Symmetric Target	1.96	0.95	2.09	48.53	13.71	-0.23	2.31	-5.46	1.2	1.46	2.71	1.71	4.47	
AIT	1.97	0.91	1.57	48.74	12.96	-0.18	2.38	-5.43	1.2	1.5	2.69	1.63	3.93	
AIT - $r_{\pi}^{AIT} = 5r_{\pi}$	1.98	0.71	0.28	48.53	7.82	-0.16	2.45	-5.33	1.2	1.54	2.70	1.72	5.16	
PLT	2.00	0.63	0.05	49.84	5.91	-0.16	3.57	-7.91	1.2	1.91	2.75	2.03	9.50	
Temp. AIT	1.96	0.95	1.98	48.05	13.74	-0.22	2.30	-5.41	1.2	1.46	2.71	1.71	4.29	
Temp. AIT - $r_{\pi}^{AIT} = 5r_{\pi}$	2.02	0.89	0.92	50.54	14.10	0.02	2.13	-4.47	1.2	1.45	2.66	1.74	5.54	
Temp. PLT	2.05	0.89	0.92	52.00	14.60	0.13	2.12	-4.09	1.2	1.45	2.60	1.78	10.30	
Panel B: RE Model														
Symmetric Target	1.91	1.04	3.66	47.50	14.12	-0.44	2.76	-7.74	1.2	1.6	2.67	1.72	4.99	
AIT	1.94	0.94	2.29	48.09	13.00	-0.30	2.72	-6.93	1.2	1.65	2.67	1.63	4.14	
AIT - $r_{\pi}^{AIT} = 5r_{\pi}$	1.98	0.7	0.21	48.57	7.57	-0.11	2.8	-6.17	1.2	1.69	2.64	1.53	3.65	
PLT	2.00	0.63	0.04	50.02	5.58	-0.05	4.43	-9.65	1.2	2.38	2.66	1.64	5.12	
Temp. AIT	1.92	1.01	3.28	47.66	14.17	-0.39	2.63	-7.16	1.2	1.60	2.68	1.71	4.60	
Temp. AIT - $r_{\pi}^{AIT} = 5r_{\pi}$	2.02	0.93	1.22	50.41	14.81	0.05	2.14	-4.57	1.2	1.52	2.66	1.72	3.72	
Temp. PLT	2.03	0.93	1.25	51.05	15.04	0.12	2.07	-4.07	1.2	1.50	2.63	1.76	8.48	

- **Three key findings:**
 - 1. Permanent AIT regime** generate more stable inflation (low deflation prob) but higher economic volatility (trade-off), especially when AIT response gap coefficient is larger.
 - 2. Permanent PLT regime** also generate more stable inflation but higher economic volatility (trade-off).
 - 3. Temporary AIT/PLT regimes** reduce both std(infl) and std(output gap), and reduce deflation probabilities notably

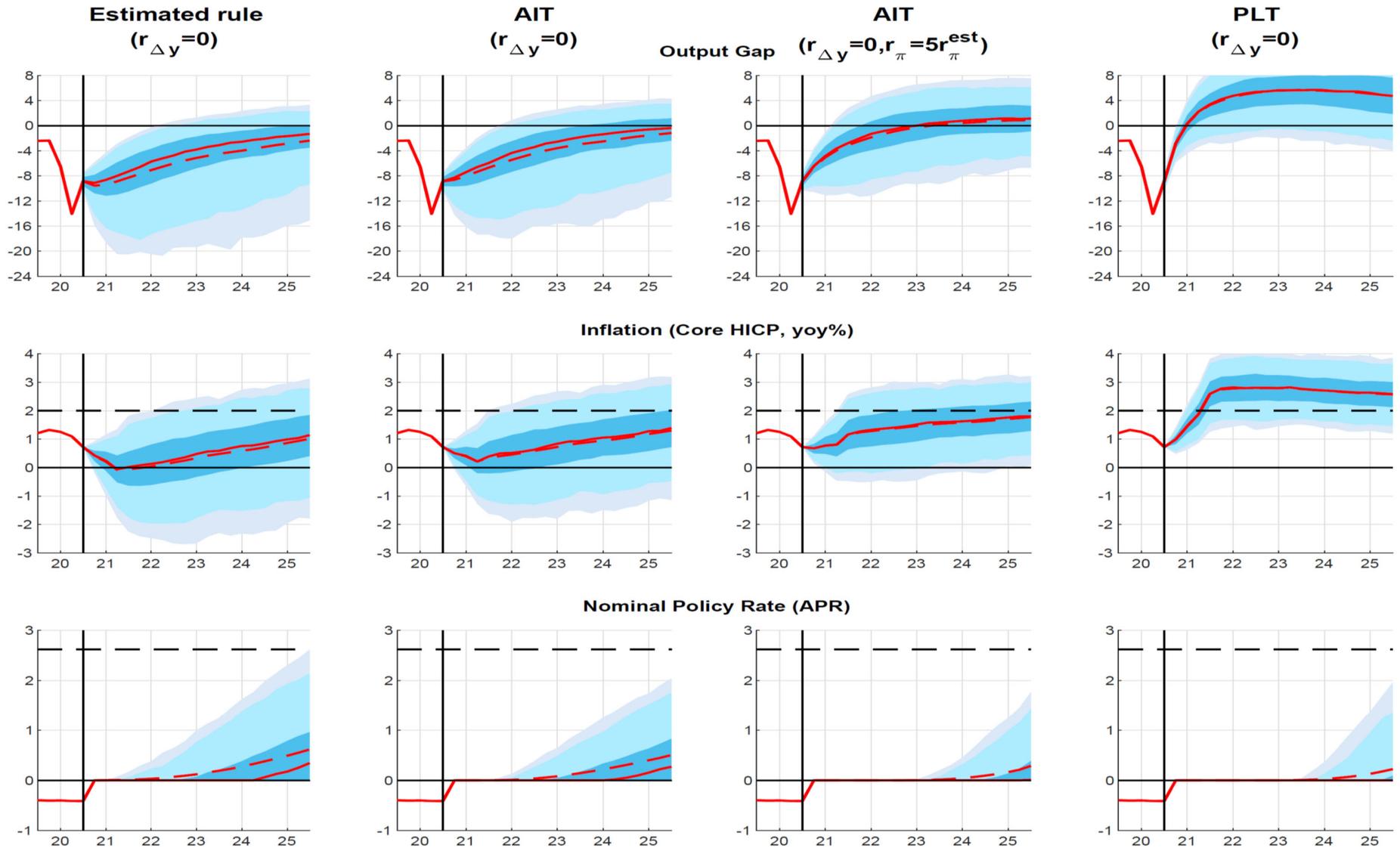
Benefits of New Frameworks: Conditional Distributions

- We now move on to **study impact on conditional distributions** for alternative strategies.
- Given state in 2020Q3, unexpected but fully credible shift to alternative regime in 2020Q4.
- Consider the following four alternatives:
 - Estimated rule with ZLB imposed.
 - Temporary AIT rule; filter initial AIT gap using core HICP for last 5 years.
 - Temporary AIT rule with larger AIT gap coefficient (5 times γ_π estimate).
 - Temporary PLT rule; filter initial gap using core HICP for last 5 years.
- **No UMP (ZLB) to tease out partial impact of alternative frameworks.**
 - Consider only symmetric rules (asymmetry matters little anyway given outlook)
 - Set $r_{\Delta y} = 0$ for all alternative rules.

Cond. Distributions 2020Q3 for Alt. Policies: BR Model

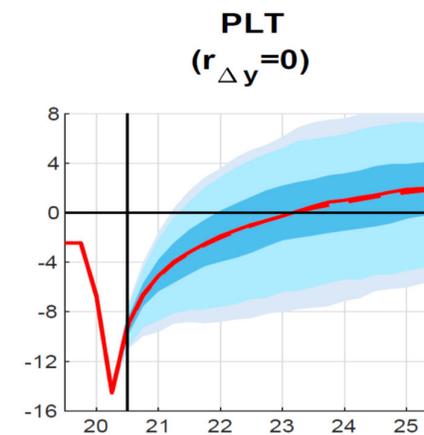
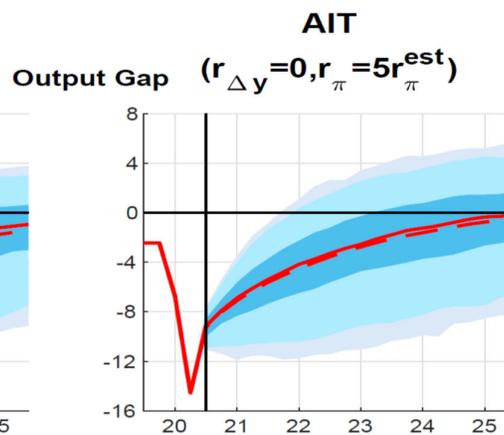
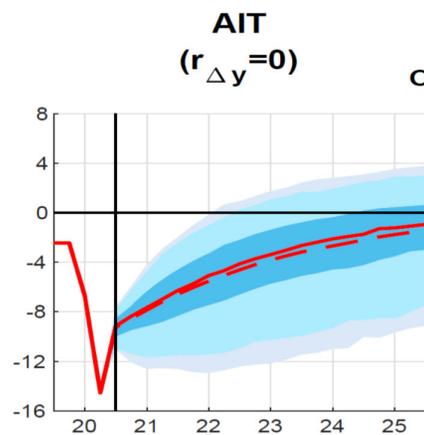
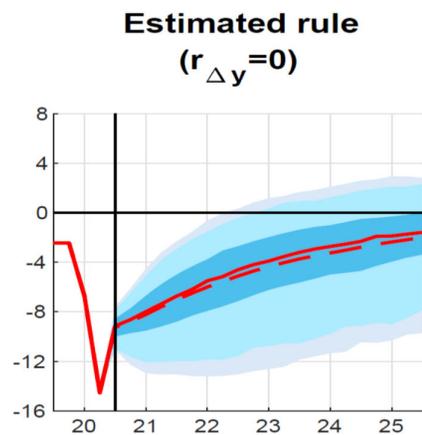


Cond. Distributions 2020Q3 for Alt. Policies: RE Model

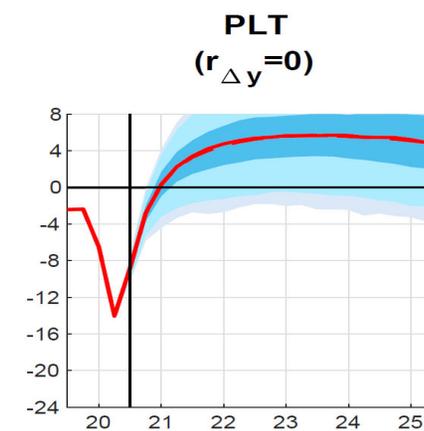
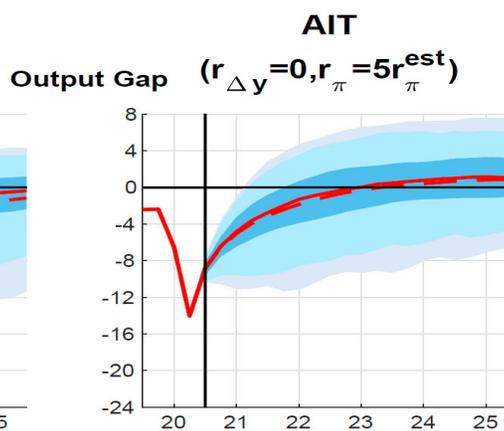
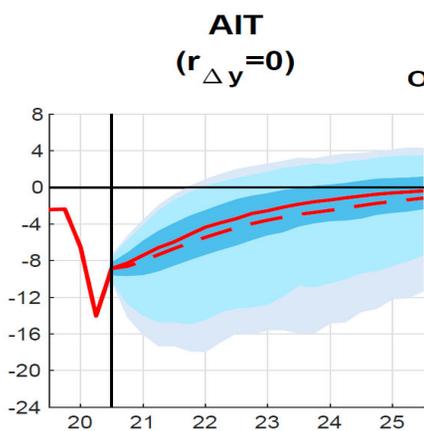
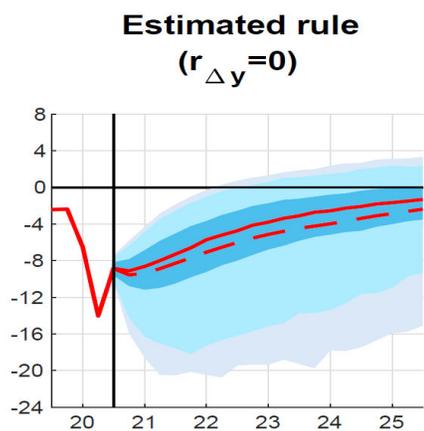


Conditional Output Gap Distributions for Alt. Policies

BR Model



RE Model



Robustness Analysis

- Examine the robustness of long-term benefits of moving to symmetric target in several dimensions:
 1. **No markup shocks.**
 2. **Behavioral expectations in pricing bloc** (φ^f estimated to be 0.95).
 3. Allowing for **a state dependent price Phillips curve**: Higher slope when output gap is positive and lower slope when there is slack.
 4. Size of **steady state real rate** ($\sigma_c = 0.5$ vs. $\sigma_c = 1.25$) in **RE Model**.
 5. **Bootstrapped shocks** as opposed to drawing i.i.d. normal shocks.
- Find that key results are robust w.r.t. alternative assumptions.
- Also study implications of behavioral expectations in the pricing bloc for conditional forecast distributions for alternative strategies.

Robustness Analysis: Unconditional Distributions

Robustness Analysis: Cost-Push Shocks and BR in Pricing Bloc

Model	Inflation					Output Gap			Output Growth		Policy Rate		
Variant	Mean	Std	$P(\pi \leq 0)$	$P(\pi > 2)$	$P(\pi > 3)$	Mean	Std	$M(x x \leq x^{5th})$	Mean	Std	Mean	Std	$P(R \leq 0)$
Baseline BR Model													
Sym. Target	1.96	0.95	2.62	44.8	11.74	-0.23	2.31	-5.46	1.2	1.46	2.71	1.71	5.38
Asym. Targ.	1.67	0.88	3.2	31.27	3.75	-1.72	2.72	-6.37	1.2	1.5	3.47	2.29	4.22
No Markup Shocks in BR Model													
Sym. Target	1.98	0.45	0.04	47.18	0.58	-0.12	2.31	-5.62	1.20	1.47	2.78	1.69	5.07
Asym. Targ.	1.83	0.35	0.04	33.82	0.00	-0.64	1.96	-5.63	1.20	1.39	2.90	1.78	4.98
Behavioral Expectations also in Pricing Bloc													
Sym. Target	1.99	0.99	2.65	46.82	13.80	-0.33	2.89	-6.75	1.20	1.45	2.79	1.84	6.22
Asym. Targ.	1.80	0.89	2.80	38.40	6.82	-3.22	4.69	-10.65	1.20	1.62	4.46	3.34	4.05

Note: All variables in the table are in annualized rates. Std is the standard deviation of the series computed based in the simulated sample with 25,000 observations. $M(x|x \leq x^{5th})$ is mean of the output gap series counting only observations below or equal its 5th percentile (which is contingent on each model variant). Benchmark is the asymmetric policy rule (5.1) without any UMP tools (i.e. first row in Table 5.1). BR denotes the model with behavioral expectations.

- **Key findings for cost-push shocks and Dev from RE in Pricing Bloc:**
 1. **Cost-Push shocks** account for sizeable share of output cost of an asymmetric target, about half of inflation bias.
 2. **Deviations from RE in pricing bloc** further boosts costs of asymmetric target. Shorter planning horizon effectively reduces the ability of the CB to control inflation through expectation channel.

Robustness Analysis: Unconditional Distributions II

Robustness Analysis: Sensitivity w.r.t. bootstrapped shocks.

Model Variant	Mean		Inflation			Output Gap			Output Growth		Policy Rate		
	Mean	Std	$P(\pi \leq 0)$	$P(\pi > 2)$	$P(\pi > 3)$	Mean	Std	$M(x x \leq x^{5th})$	Mean	Std	Mean	Std	$P(R \leq 0)$
Baseline BR Model													
Sym. Target	1.96	0.95	2.09	48.53	13.71	-0.23	2.31	-5.46	1.2	1.46	2.71	1.71	4.47
Asym. Targ.	1.67	0.88	2.52	35.09	4.74	-1.72	2.72	-6.37	1.2	1.5	3.47	2.29	3.40
BR Model with Bootstrapped Shocks													
Sym. Target	1.71	1.15	6.02	38.07	11.73	-0.30	3.53	-8.68	1.2	2.07	2.88	2.44	8.57
Asym. Targ.	1.47	1.07	6.53	28.22	3.52	-1.41	3.70	-8.89	1.2	2.11	3.41	3.11	8.02

Note: All variables in the table are in annualized rates. Std is the standard deviation of the series computed based in the simulated sample with 25,000 observations. $M(x|x \leq x^{5th})$ is mean of the output gap series counting only observations below or equal its 5th percentile (which is contingent on each model variant). Benchmark is the asymmetric policy rule (5.1) without any UMP\ tools (i.e. first row in Table 5.1). BR denotes the model with behavioral expectations.

- Key findings for bootstrapped shocks:**
 - Lower mean but higher standard deviation for inflation, especially for the symmetric rule.**
 - Higher output volatility (std), but higher mean output.**
 - True in both BR and RE variants of model (only show BR variant).**

Robustness Analysis: Unconditional Distributions III

Robustness Analysis: State Dependent Slope of Price Phillips Curve.

Model	Inflation					Output Gap			Output Growth		Policy Rate		
Variant	Mean	Std	$P(\pi \leq 0)$	$P(\pi > 2)$	$P(\pi > 3)$	Mean	Std	$M(x x \leq x^{5th})$	Mean	Std	Mean	Std	$P(R \leq 0)$
	Baseline BR Model												
Sym. Target	1.96	0.95	2.62	44.8	11.74	-0.23	2.31	-5.46	1.2	1.46	2.71	1.71	5.38
Asym. Targ.	1.67	0.88	3.2	31.27	3.75	-1.72	2.72	-6.37	1.2	1.5	3.47	2.29	4.22
	State Dep. Slope of Price Phillips Curve (BR Model)												
Sym. Target	2.14	1.03	1.44	49.89	16.73	-0.30	2.21	-5.07	1.2	1.44	2.85	1.81	4.33
Asym. Targ.	1.81	0.81	1.62	36.97	5.71	-2.12	3.23	-7.54	1.20	1.54	3.89	2.41	2.02

Note: All variables in the table are in annualized rates. Std is the standard deviation of the series computed based in the simulated sample with 25,000 observations. $M(x|x \leq x^{5th})$ is mean of the output gap series counting only observations below or equal its 5th percentile (which is contingent on each model variant). Benchmark is the asymmetric policy rule (5.1) without any UMP tools (i.e. first row in Table 5.1). BR denotes the model with behavioral expectations.

- Key findings for state dependent slope of Price Phillips Curve (BR Model):**
 - Under asymmetric target, state dependent pricing somewhat amplifies output cost but reduce inflation bias (tradeoff).
 - Symmetric target leads to a slight positive inflation bias (since state dependence pricing function is convex).

Robustness Analysis: Conditional Gains of Alt Strategies

- **Behavioral expectations for households only; RE for firms and LUs. Sizeable gains.**

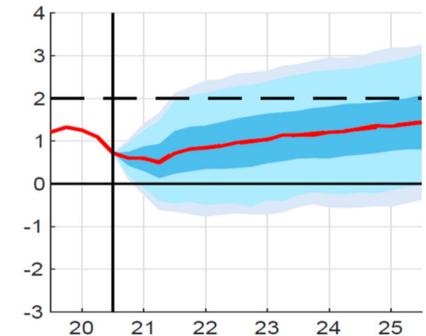
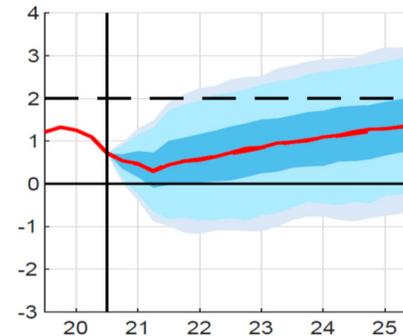
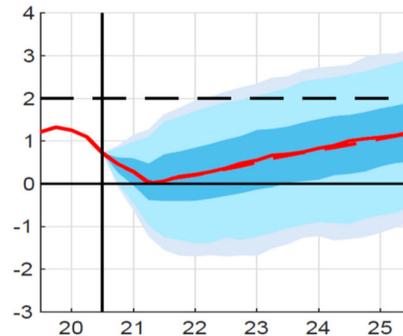
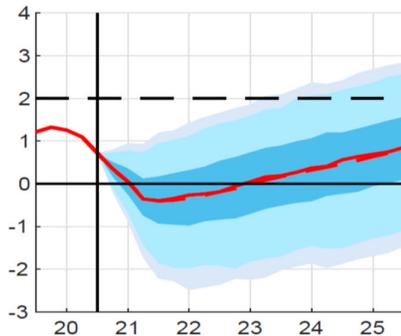
Estimated Rule (symmetric)

AIT

AIT - large AIT gap coeff

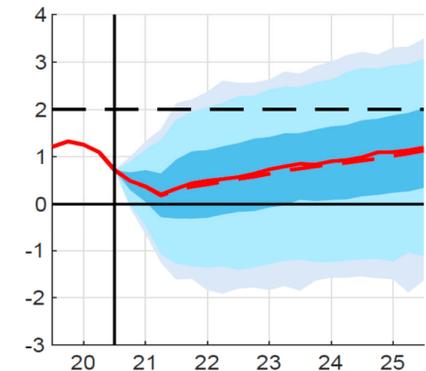
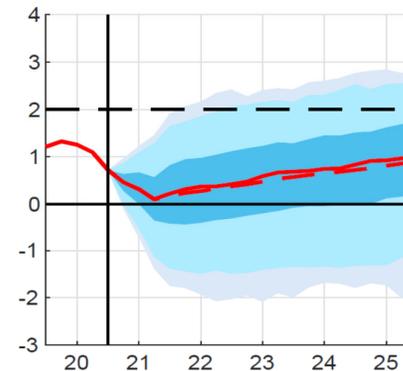
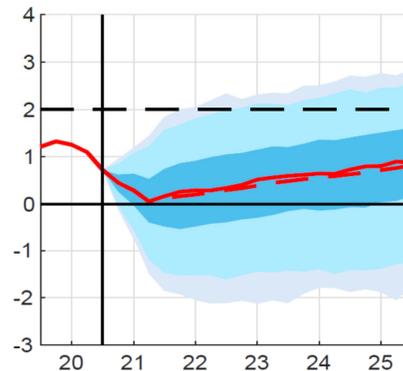
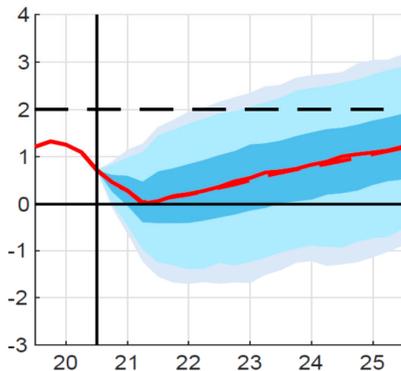
PLT

Inflation (Core HICP, yoy%)



- **Behavioral expectations for all agents in the model. Notably smaller gains.**

Inflation (Core HICP, yoy%)



Conclusions

- **Sizeable gains of moving to a symmetric target.**
 - Asymmetric target associated with large negative mean output gap and downward inflation bias – a finding driven by a flat Phillips curve and important role for trade-off (cost-push) shocks.
 - Findings support recent move towards symmetric interpretation of target.
- **UMP cannot fully offset adverse effects of an asymmetric target in a low rate environment.**
 - Large **conditional gains** and small unconditional losses **from reducing role of output growth** in the conduct of monetary policy (focus more on gap instead).
- **AIT/PLT strategies have favorable conditional short-term properties** (exactly how large depends importantly on expectational effects), but permanent AIT/PLT regimes may be costly unconditionally (i.e. long-term).
 - **Temporary AIT/PLT regimes** harvest most of the conditional benefits and work better unconditionally.

Future Extensions

- **Future work:** Useful to extend our work in a number of dimensions:
 - (a) Adopt a **loss function-based approach** (see e.g. Svensson, 2018).
 - (b) Implications of **alternative ways to address the FG puzzle**.
 - (c) How **fiscal policy** can provide support when MP is constrained.
 - (d) Moving to a **fully nonlinear** framework.