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Could a Higher Inflation Target Enhance Macroeconomic Stability?

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Introduction

- Prior to crisis, 2% inflation target was viewed as sufficiently high to make the ELB constraint irrelevant
- Great Recession has shown that ELB can be a more persistent and severe constraint than anticipated
- In this context, targeting a higher inflation could be beneficial
- **This paper:** Evaluate whether an increase in the inflation target to 3% or 4% could improve macroeconomic stability

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What We Do

- Compare stochastic steady states under alternative inflation targets:
  - Inflation/output gaps in periods of large negative shocks
  - Unconditional volatility of inflation and output gaps

- Assume that the policy rate follows simple estimated rule
  - Does a good job of capturing the Bank's historical behaviour

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What We Do

- Consider alternative assumptions about:
  - Availability of unconventional monetary policies (UMP)
    - Forward guidance
    - Quantitative easing (QE)
  - Level of the (steady-state) real neutral rate
    - Conventional view: 1.5%
    - Secular stagnation view: 0 or negative

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What We Find

- The magnitude of the real neutral rate is crucial

- For real neutral rate of 1.5%:
  - Without UMP: Raising inflation target is beneficial
  - With UMP: No benefits of raising the target to 3% or 4%

- Under the secular stagnation view of neutral rate
  - Higher inflation target is beneficial regardless of UMP

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What We Don’t Do

- Transitional dynamics
- Imperfect credibility
- Welfare
- Optimal rate of inflation

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Plan of the Talk

1. Model and Methodology
2. Revisiting the Probability of Hitting the ELB
3. Impact of a Higher Inflation Target
4. Secular Stagnation and the Case for a Higher Target
5. Concluding Remarks

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Model and Methodology

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ToTEM

- Small open economy DSGE model of the Canadian economy
- Large-scale model with multiple sectors
- NKPC with over discounting of expected real marginal costs
- Time varying term premium and independent role for long term rates
- Estimated to fit Canadian data

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Monetary Policy

- Simple rule that respects ELB:

$$R_t = \max\left[ELB, 0.85R_{t-1} + 0.15\left(\bar{r} + \bar{\pi} + 4.65\left(\frac{\sum_{j=1}^{4}\pi_{t+j}}{4} - \bar{\pi}\right) + 0.4x_t\right)\right]$$

- Estimated to fit historical behaviour of BoC

- We change $\bar{\pi}$ holding all other parameters constant

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Methodology

- Model Solution
  - Global nonlinear methods are not suitable for large scale models like ToTEM
  - Two key simplifications:
    - Linearized model with ELB as the only nonlinearity
    - Modal rather than mean expectations

- Stochastic simulations
  - Shocks drawn from a multivariate normal distribution
  - Variance-covariance matrix of shocks was estimated using the shocks backed out over 1995Q1 – 2015Q2

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Revisiting the Probability of Hitting the ELB

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Lower Neutral Rate Makes ELB Episodes More Likely

- **Neutral Rate:** Equilibrium rate abstracting from cyclical shocks

- Real neutral rate has declined substantially:
  - Mid-2000s: ~3.0 per cent
  - 2014: ~1.5 per cent

- Implications:
  - Less room to cut rates before hitting ELB
  - Greater frequency of ELB episodes

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Possibility of Negative Policy Rates Would Make ELB Episodes Less Likely

- ELB traditionally thought to be zero or slightly positive
  - 25 bps in Canada in 2009
- Recent international experience challenges this assumption
  - Policy rates negative in Denmark, Euro Area, Japan, Sweden, Switzerland
- 2015 BoC estimate of ELB: -50 bps
- Negative ELB would imply less frequent ELB episodes

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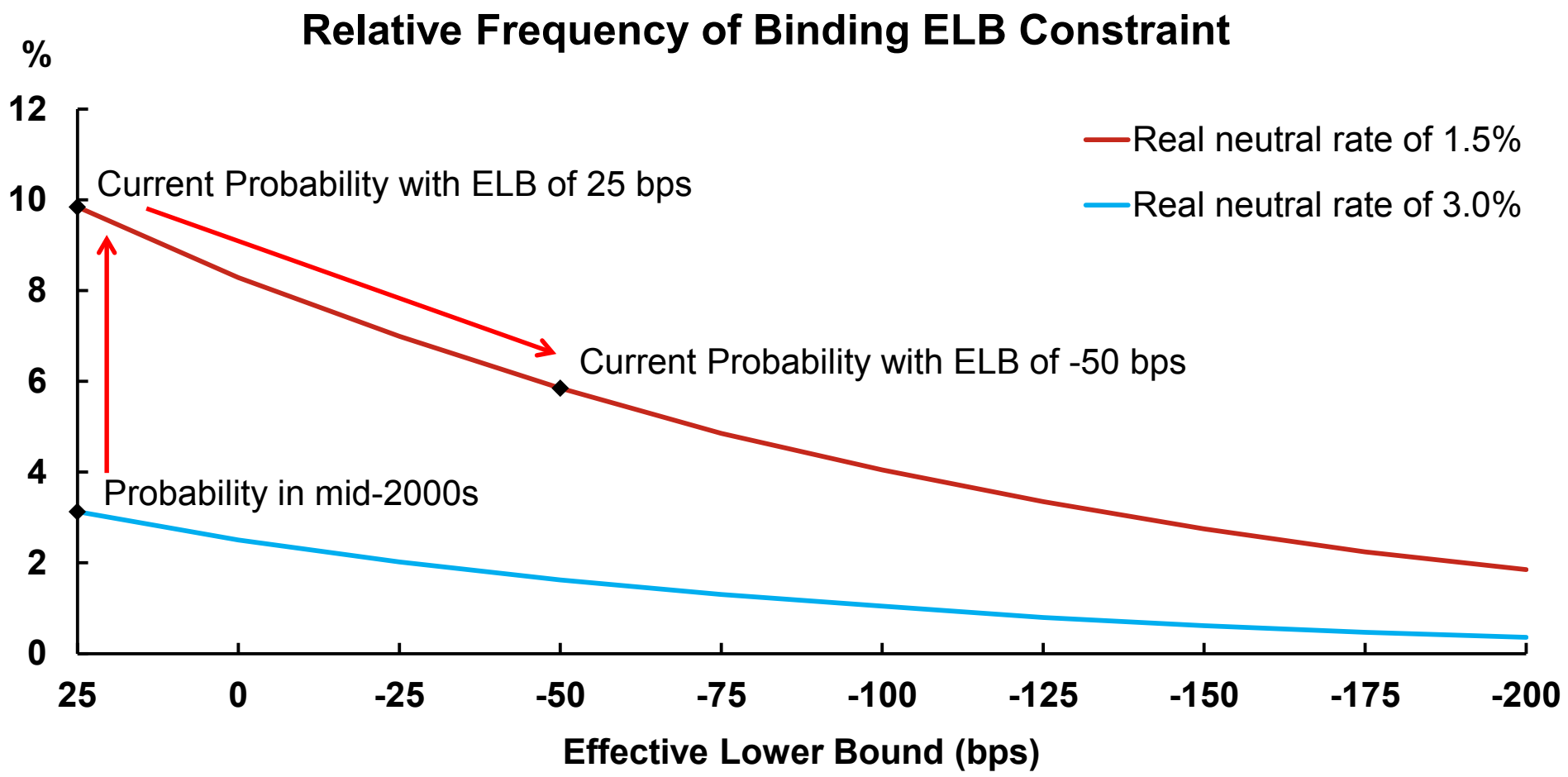
Negative ELB Could Mitigate Impact of Lower Neutral Rate



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Impact of a Higher Inflation Target

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Frequency and Duration of ELB Episodes

Real Neutral Rate (%)	ELB (%)	Inflation Target (%)	Proportion of time ELB is binding (%)	Average Duration (qrts)	ELB Duration at 90th Percentile (qrts)
1.5	-0.5	2.0	5.8	6.1	13
		3.0	2.6	2.5	8
		4.0	1.0	1.0	4

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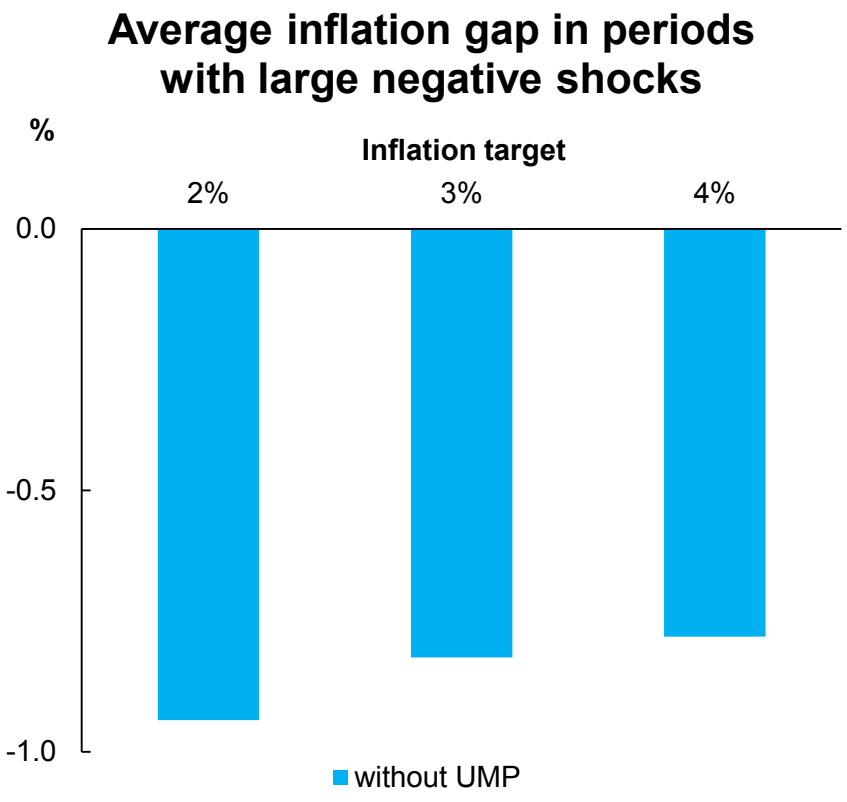
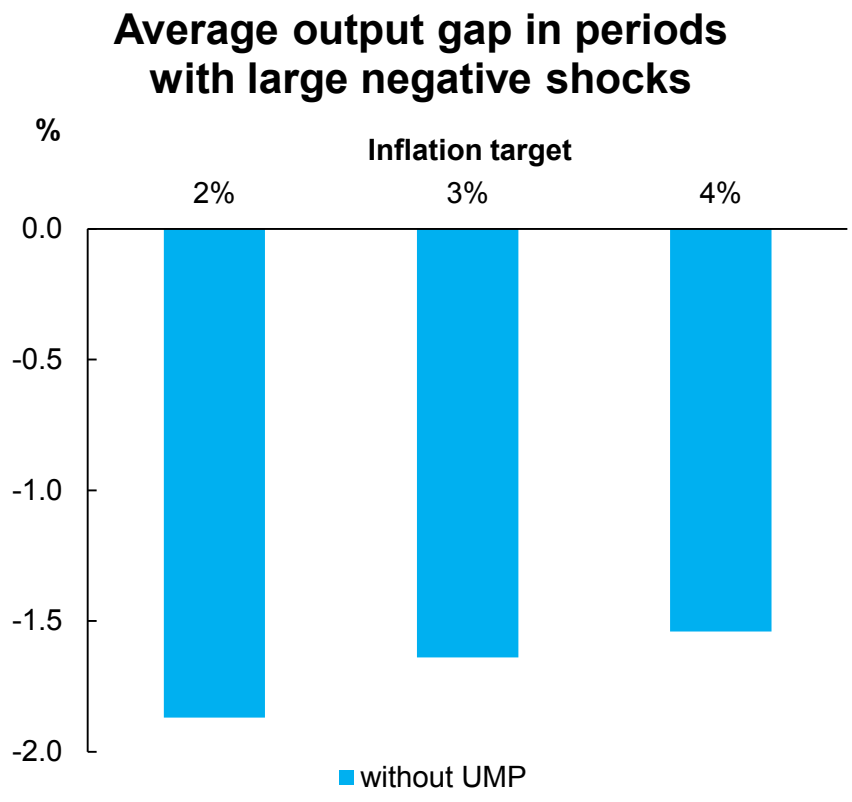
Higher Target Improves Outcomes in Periods with Large Negative Shocks





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Unconventional Monetary Policy (UMP)

- Preceding analysis abstracted from UMP
- To what extent can UMP substitute for higher target?
- Empirical evidence suggests that UMP can be effective
  - Though uncertainty remains about costs and limits

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Incorporating Unconventional Monetary Policy

- Simulations assume QE and forward guidance implemented every time the ELB binds:
  - **Forward Guidance:** Bank commits not to raise rates at least until unemployment rate falls below a threshold level.
  - **QE:** Bank purchases longer-term government bonds in sufficient quantities to reduce the term premium to -40 bps.

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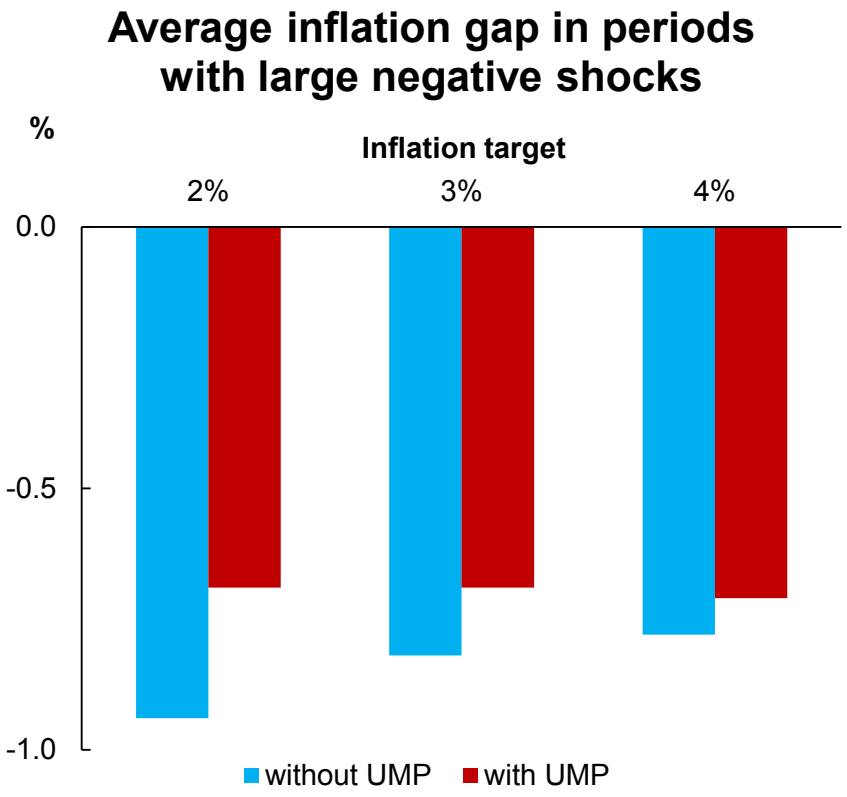
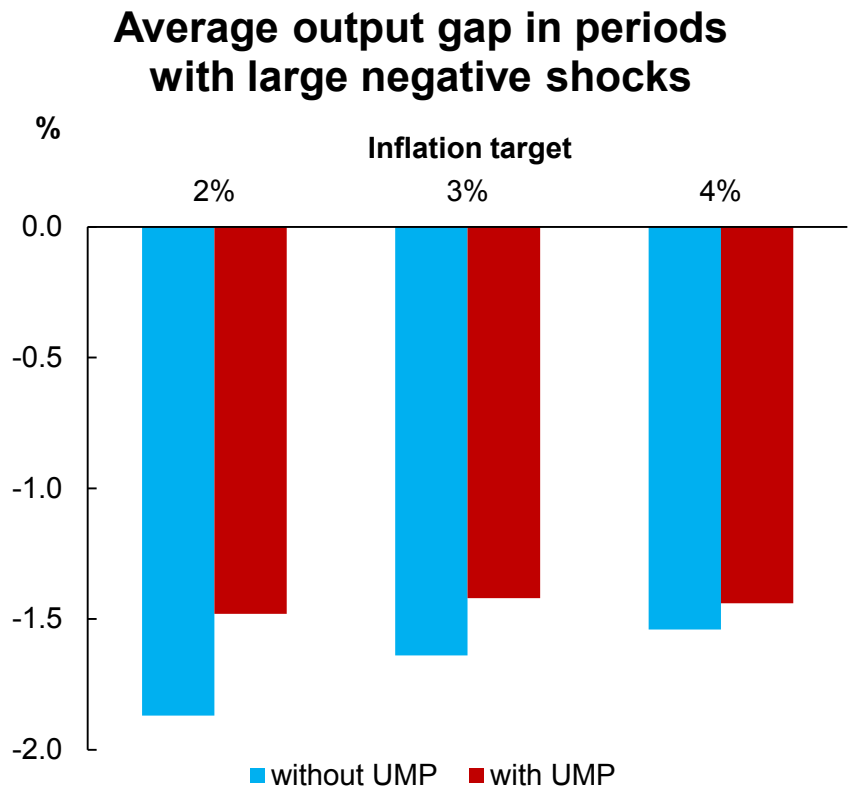
Unconventional Monetary Policy Mitigates Need for Higher Target





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Secular Stagnation and the Case for a Higher Target

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Secular Stagnation and the Case for a Higher Target

- Eggertsson and Summers (2016):

  In a world of secular stagnation, the presumption of an automatic return to 'normal' is unwarranted as the natural rate of interest can be persistently or even permanently negative."

- Consider two cases of secular stagnation:
  - Zero neutral rate ("mild")
  - -1.5% neutral rate ("severe")

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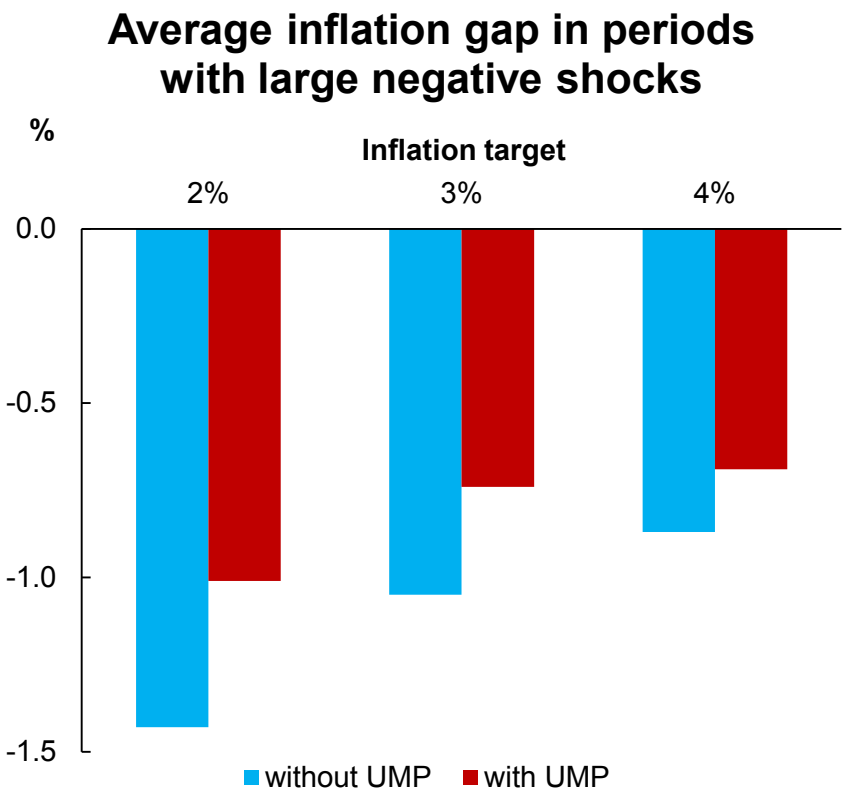
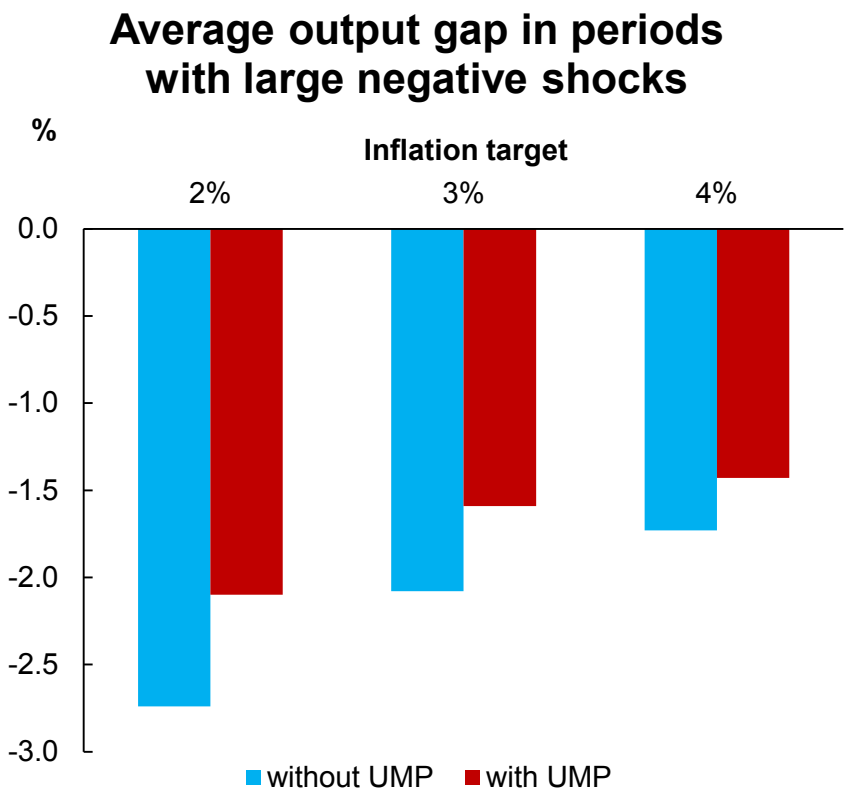
Mild Secular Stagnation (Zero Real Neutral Rate)





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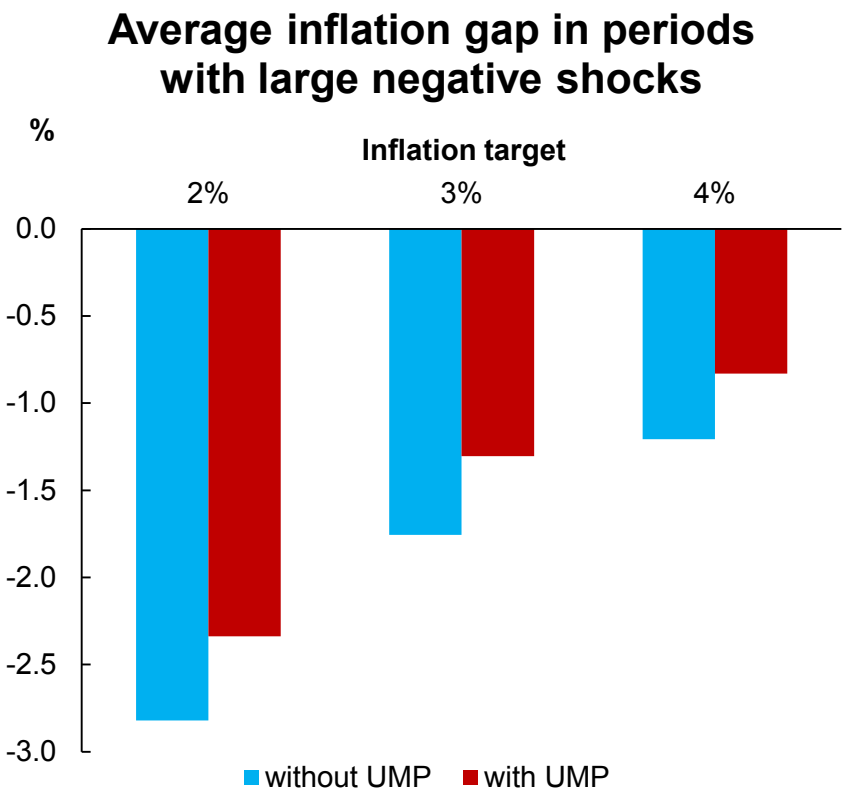
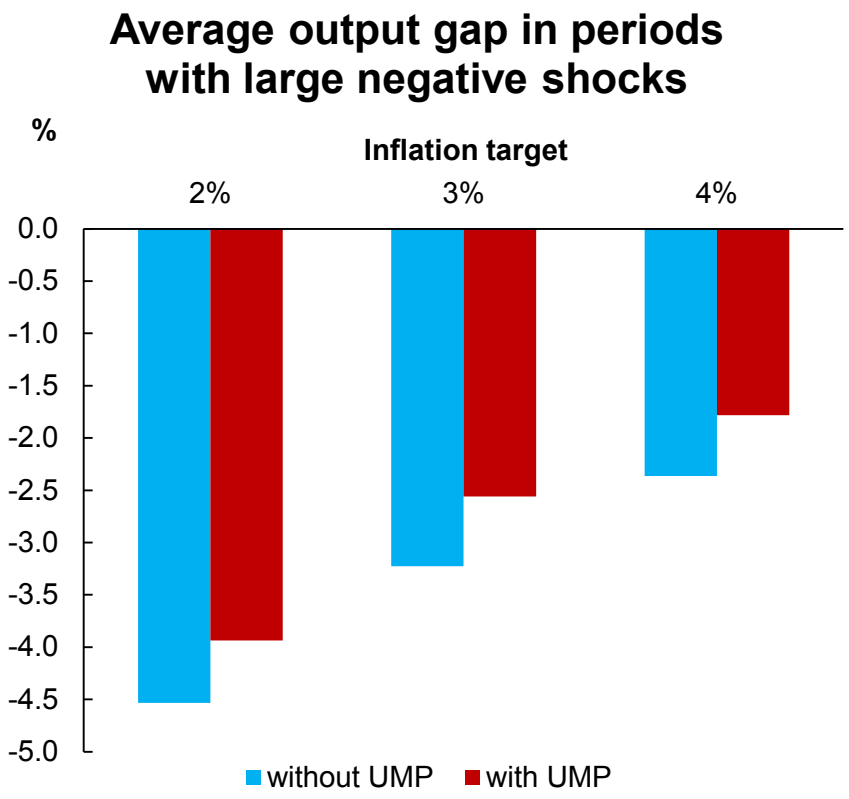
Severe Secular Stagnation (-1.5% Real Neutral Rate)





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Concluding Remarks

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Concluding Remarks

- Under conventional assumptions about the real neutral rate:
  - A higher target would yield
    - Modest gains in macroeconomic stability without UMP
    - Virtually no gains with UMP

- But, with a neutral rate consistent with secular stagnation hypothesis:
  - A higher target yields significantly better outcomes, regardless of UMP

- Case for a higher target will depend on weight assigned to risk of secular stagnation

Thank you

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Forward Guidance Puzzle

- Address FG puzzle by making NKPC less forward-looking
- Introduce rule-of-thumb price setters (share ω):

$$\pi_t = \bar{\pi} + \frac{(1-\omega)(1-\theta)(1-\beta\theta)}{\theta + \omega(1-\theta)} \sum_{i=0}^{\infty} \left(\frac{\beta\theta}{\theta + \omega(1-\theta)} \right)^i \widehat{rmc}^c_{t+i}$$

- In ToTEM, estimated $\omega = 0.48$
  - Implies greater discounting of future RMC

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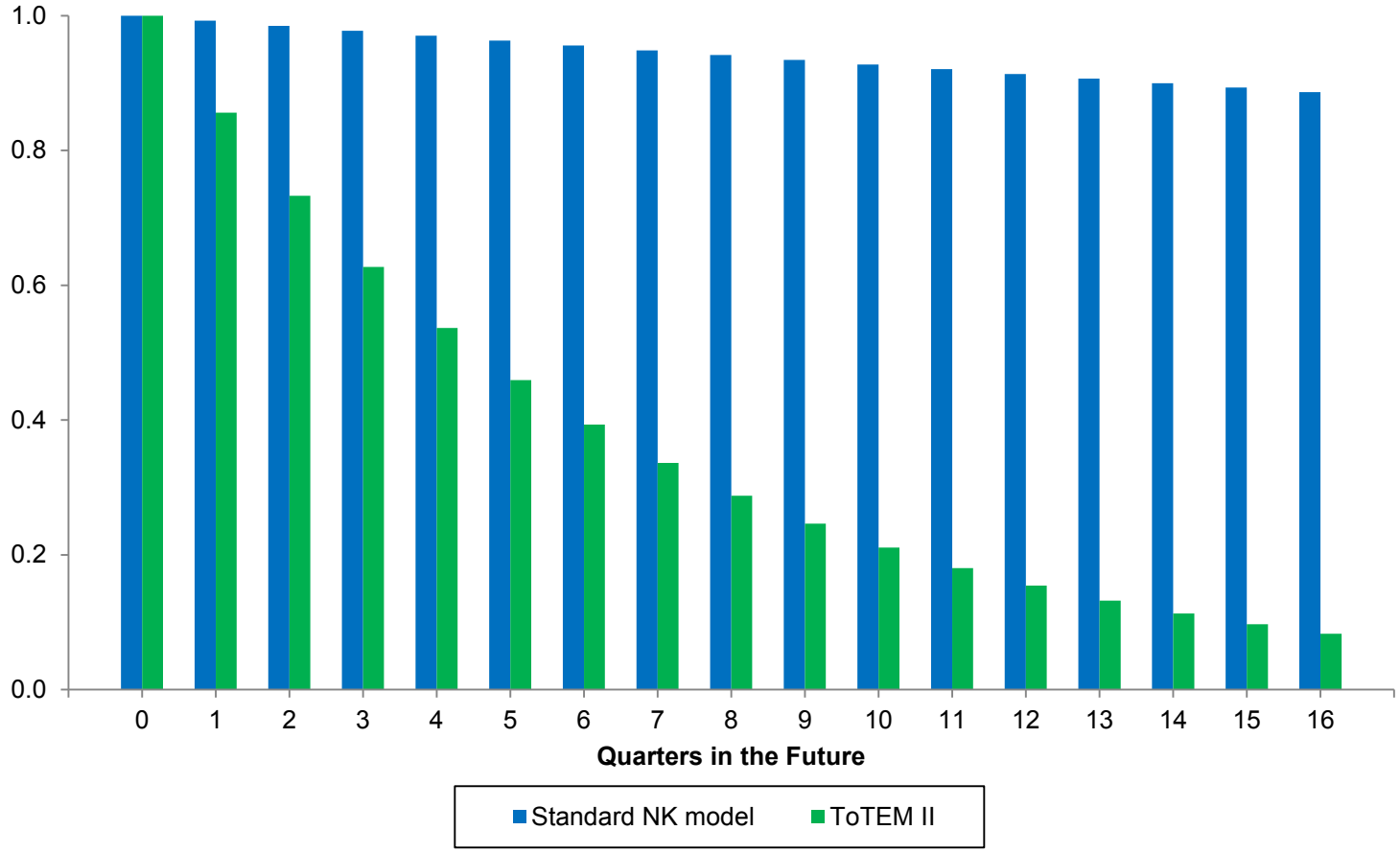
Estimated share of RT firms significantly reduces the weights applied on expected real marginal costs



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Long Rates and Aggregate Demand in ToTEM

- Relationship between short- and long-term rates:

$$\hat{R}_t^{20} = \frac{1}{20}\sum_{j=0}^{19} E_t \hat{R}_{t+j} + tp_t$$

- Aggregate consumption Euler equation:

$$\hat{C}_t^l = \xi \hat{C}_{t-1}^l + E_t\left[\hat{C}_{t+20}^l - \xi \hat{C}_{t+19}^l\right] - \mu(1-\xi)\left[s_u \sum_{j=0}^{19} E_t\, \hat{R}_{t+j} + (1-s_u)20\hat{R}_t^{20}\right] + \mu(1-\xi)\sum_{j=0}^{19} E_t \hat{\pi}_{t+j+1}$$