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.
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
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
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
What We Don’t Do

- Transitional dynamics
- Imperfect credibility
- Welfare
- Optimal rate of inflation
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
Model and Methodology
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
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
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
Revisiting the Probability of Hitting the ELB
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
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
Negative ELB Could Mitigate Impact of Lower Neutral Rate

Relative Frequency of Binding ELB Constraint

Current Probability with ELB of 25 bps

Current Probability with ELB of -50 bps

Probability in mid-2000s

Real neutral rate of 1.5%

Real neutral rate of 3.0%

Effective Lower Bound (bps)
Impact of a Higher Inflation Target
Frequency and Duration of ELB Episodes

<table>
<thead>
<tr>
<th>Real Neutral Rate (%)</th>
<th>ELB (%)</th>
<th>Inflation Target (%)</th>
<th>Proportion of time ELB is binding (%)</th>
<th>Average Duration (qrts)</th>
<th>ELB Duration at 90th Percentile (qrts)</th>
</tr>
</thead>
<tbody>
<tr>
<td>1.5</td>
<td>-0.5</td>
<td>2.0</td>
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<td>1.0</td>
<td>1.0</td>
<td>4</td>
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</tbody>
</table>
Higher Target Improves Outcomes in Periods with Large Negative Shocks

Average inflation gap in periods with large negative shocks

- Inflation target
  - 2%
  - 3%
  - 4%

Average output gap in periods with large negative shocks

- Inflation target
  - 2%
  - 3%
  - 4%
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
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.
Unconventional Monetary Policy Mitigates Need for Higher Target

Average inflation gap in periods with large negative shocks

Average output gap in periods with large negative shocks

Inflation target

without UMP  with UMP

without UMP  with UMP
Secular Stagnation and the Case for a Higher Target
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")
Mild Secular Stagnation (Zero Real Neutral Rate)

Average inflation gap in periods with large negative shocks

Average output gap in periods with large negative shocks
Severe Secular Stagnation (-1.5% Real Neutral Rate)

Average inflation gap in periods with large negative shocks

Average output gap in periods with large negative shocks

without UMP     with UMP

Inflation target

2% 3% 4%
Concluding Remarks
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
Forward Guidance Puzzle

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

$$\pi_t = \bar{\pi} + \frac{(1 - \omega)(1 - \theta)(1 - \beta \theta)}{\theta + \omega(1 - \theta)} \sum_{i=0}^{\infty} \left( \frac{\beta \theta}{\theta + \omega(1 - \theta)} \right)^i \hat{mc}_{t+i}^c$$

- In ToTEM, estimated $\omega = 0.48$
  - Implies greater discounting of future RMC
Estimated share of RT firms significantly reduces the weights applied on expected real marginal costs
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:
  \[
  \hat{C}_t^l = \xi \hat{C}_{t-1}^l + E_t \left[ \hat{C}_{t+20}^l - \xi \hat{C}_{t+19}^l \right] \\
  -\mu(1-\xi) \left[ s_u \sum_{j=0}^{19} E_t \hat{R}_{t+j} + (1-s_u)20\hat{R}_t^{20} \right] + \mu(1-\xi) \sum_{j=0}^{19} E_t \hat{\pi}_{t+j+1}
  \]