Raising the Inflation Target: How Much Extra Room Does It Really Give?

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Motivation: Higher Inflation Now, But Structural Threat of Liquidity Traps in the Future? Big Shocks?

- Our question:

  If raise the target to get extra room:
  What are the **constraints** faced by the policy maker?

- Not only theory: we quantify these constraints

- How much more policy room does one *really* get?
  - Some, but less than intended
  - Reason: Private sector will react to policy
    Thus: target needs to be raised *by more*

First-Order Reaction by Private Sector

- Firms adjust prices more frequently
  - Old idea: Ball, Mankiw & Romer (1988)
    higher trend inflation $\Longrightarrow$ increased price flexibility
  - We present new empirical evidence
- Phillips Curve steepens + Potency of monetary policy $\downarrow$
- Key implication:
  Need to adjust nominal rate by more in recessions

Results

1. Evidence on relation between target and frequency, U.S.

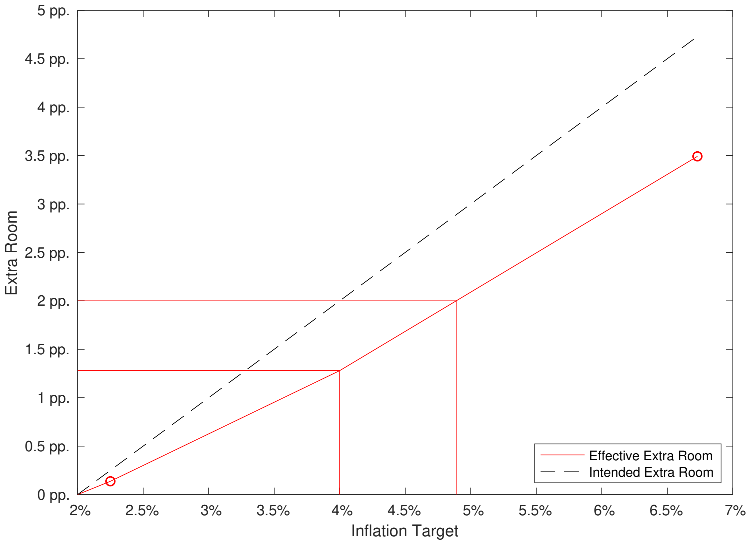
2. Because of potency loss:

$$\textit{effective extra room} < \textit{intended extra room}$$

   Raising from 2 to 4%: only 0.51 to 1.60 pp. eff. extra room
   To effectively get more room, need to increase target by more

3. Higher optimal target

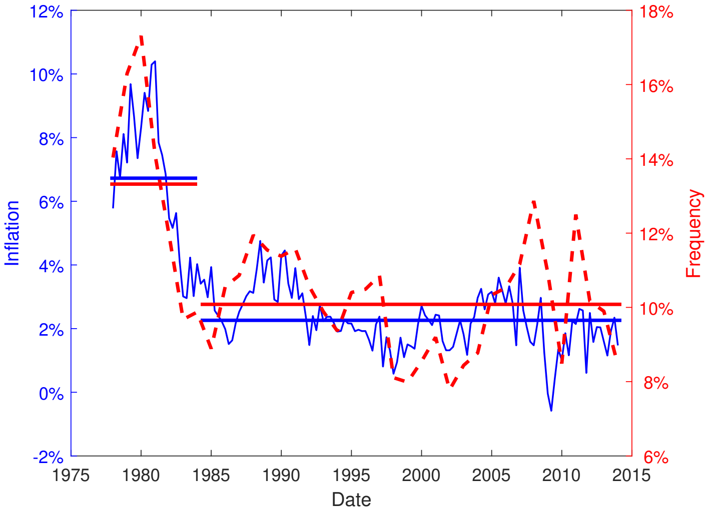
Intended and Effective Extra Room



Effective extra room is substantially smaller than intended room

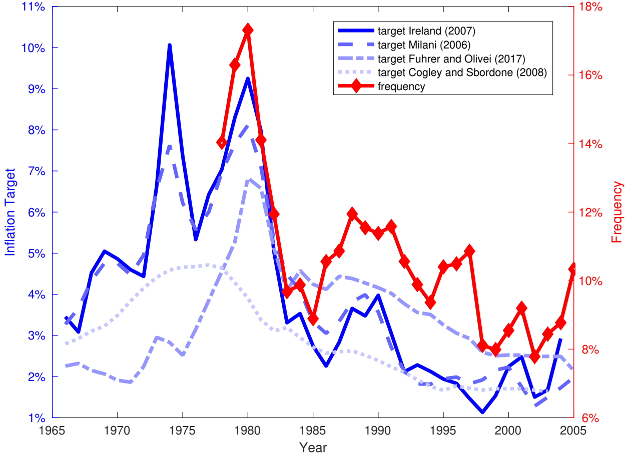
EMPIRICS

Monthly Frequency and Inflation, U.S. 1978–2015



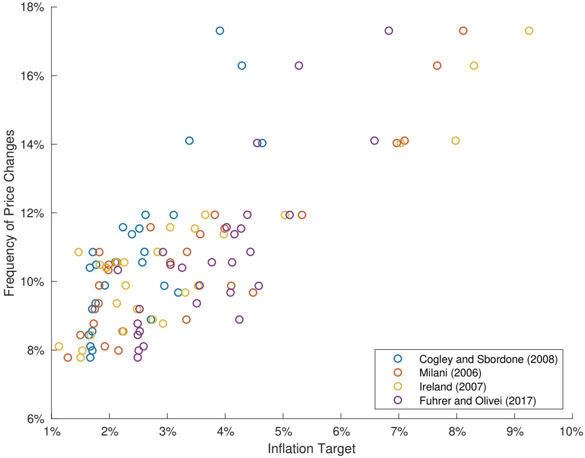
Positive relation between inflation and frequency:
High vs low-inflation-target period

Monthly Frequency and Inflation Target Measures, Over Time



Positive relation between target and frequency

Monthly Frequency and Inflation Target Measures, Scatter Plot



Slope approximately 1

Estimated equation: $freq_t = \beta_0 + \beta_1 \overline{\pi}_t + \epsilon_t$

Table: Frequency of Price Changes and Inflation Target

	(I)	(II)	(III)	(IV)
Target $\overline{\pi}_t$	1.61***	0.98***	1.04***	2.26***
	(0.21)	(0.09)	(0.11)	(0.33)
constant	4.61***	7.42***	7.26***	5.25***
	(0.84)	(0.36)	(0.42)	(0.87)
N	28	27	28	26
R^2	68%	83%	78%	66%
Data means:				
$\overline{\pi}_t$	3.42	4.04	3.90	2.85
$freq_t$	10.69	10.75	10.69	10.8

Notes: *** denotes significant at the 1% level.
(I) Fuhrer and Olivei, (II) Ireland, (III) Milani, (IV) Cogley and Sbordone.

Simple NK Model

- NK model with trend inflation
- Perfect indexation $\Longrightarrow$ cancels effect of trend inflation Phillips curve (PC) is standard (Ascari 2004)
- Output gap shocks

Increased Price Flexibility: Calvo Parameter θ

- **Assumption:** prices more flexible the higher the target:

$$\frac{\partial \theta}{\partial \overline{\pi}} < 0$$

- Slope of PC: $\kappa(\theta) \in [0, \infty)$ (decreasing function)
  - Thus: κ increasing function of $\overline{\pi}$

- Here: theoretical
  Later: empirical relationship
  (Also extension where disciplined by menu cost model)

Thought Experiment

- Consider 2 economies, economy 1 and economy 2, s.t.

$$\overline{\pi}_2 > \overline{\pi}_1$$

  - Thus, $\bar{i}_2 > \bar{i}_1$ and $\kappa_2 > \kappa_1$

- Consider shock that brings the rate to 0 in economy 1. Denote it η^0.

  RESULT: $\eta^0 = -\frac{1+\phi\kappa_1}{\phi\kappa_1}\bar{i}_1$

- Now, suppose η^0 hits economy 2.
  Question: By how much does i_2 move? And what is the remaining *effective* room away from 0?

Main Result: Formula for Effective Extra Room

Theorem

Consider the shock η^0. Then, the effective extra policy room is given by

$$\mathfrak{R}^{eff}(\eta^0) = \Delta\overline{\pi} + \Delta\mathfrak{P} \cdot |\eta^0|$$

where $\Delta\mathfrak{P}$ is the loss of potency of monetary policy, equal to

$$\Delta\mathfrak{P} = -\frac{\phi(\kappa_2 - \kappa_1)}{(1+\phi\kappa_1)(1+\phi\kappa_2)} < 0$$

- Proof proceeds by simple algebra
- Notice: $\mathfrak{R}^{eff}(\eta^0) < \Delta\overline{\pi}$

The Formula: Quantitative Insights

$$\mathfrak{R}^{eff}(\eta^0) = \Delta\overline{\pi} + \Delta\mathfrak{P} \cdot |\eta^0|$$

- According to formula, difference $\mathfrak{R}^{eff}(\eta^0) - \Delta\overline{\pi}$ depends on

  change in potency $\times$ *size of shock*

- The second term is large

- Thus: $\mathfrak{R}^{eff}(\eta^0) - \Delta\overline{\pi}$ relevant if $\Delta\mathfrak{P} < 0$
  (not relevant if $\Delta\mathfrak{P}$ is zero or negligeable)

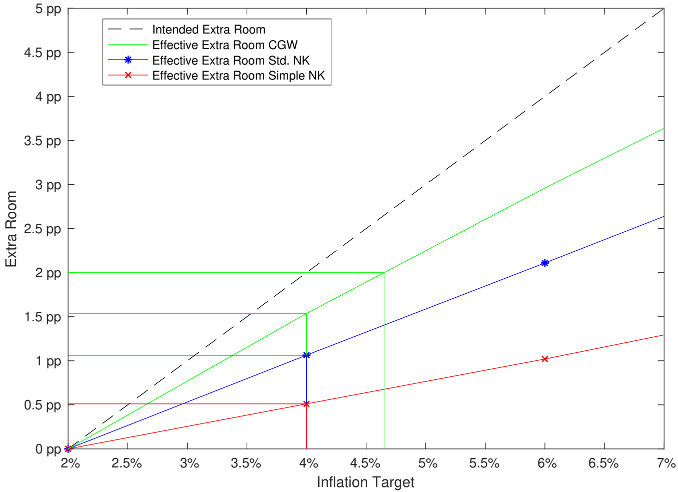
QUANTITATIVE MODELS

How much *effective* extra room?

Models

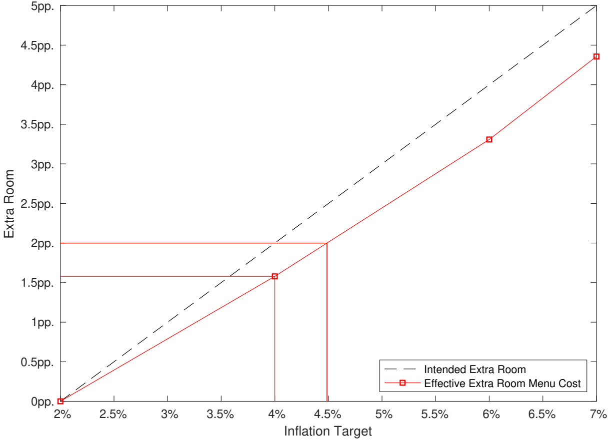
1. Simple NK (simple interest rate rule)
2. Standard NK (Taylor rule)
3. Medium Scale: Coibion, Gorodnichenko & Wieland (2012)
4. Menu cost model: Dotsey, King & Wolman (1999)

Effective and Intended Extra Room, NK Models



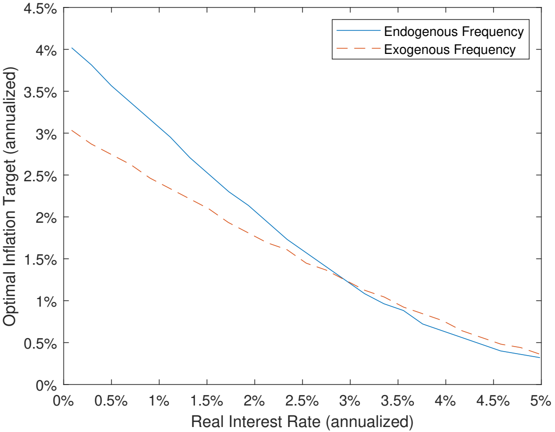
Effective extra room is substantially smaller than intended room

2. Using a Medium-Scale Menu Cost Model (Similar to Dotsey et al. 1999)



Quantitatively similar gain in effective extra room

Optimal Target



Lower r^* increases ZLB risk. Also, increased price flexibility increases the cost of ZLB.

Takeaways

1. Higher inflation target $\Longrightarrow$ increased price flexibility
2. $\mathfrak{R}^{eff}(\eta^0) < \Delta\overline{\pi}$
3. Policy:
   "Do not raise it, or, if you raise it, make sure you raise it enough."