The Welfare Implications of Inflation versus Price-Level Targeting in a Two-Sector Small Open Economy

Eva Ortega and Nooman Rebei

Bank of Canada

The Welfare Implications of Inflation versus Price-Level Targeting in a Two-Sector Small Open Economy

Eva Ortega and Nooman Rebei

Bank of Canada

PRELIMINARY, PRELIMINAIRE, PRELIMINAR, AOUALI!!!!!

Goals

1. Characterize the simple monetary policy reaction function that would have maximized welfare in a small open economy multi-sector model estimated for Canada.

   We investigate different specifications: wage inflation targets, sectoral inflation targets.

2. Would there be any welfare gain of considering an explicit price-level target?

   Stabilizing the price level can have implications for business cycle volatility and welfare.

Context: several similar models estimated, none of them investigates welfare implications of monetary policy in a multisectoral setup.

How?

1. Small open economy DSGE model with traded and non-traded sectors estimated using quarterly data for Canada

2. Welfare and implied volatility of alternative simple monetary policy reaction functions

3. Same for rules that react to deviations of the price level from a prespecified target path

Results

- Welfare gain with respect to estimated Taylor rule if ρ_π slightly higher and no reaction to output gap ($\rho_y = 0$)

- Substantial gain if reacting only to π^N (the more sticky sector) but very high volatility

- No noticeable gain from price-level targeting or hybrid rule, only accepted with very little reacting monetary policy (longer horizons for bringing price and inflation to target)

- Prefered specification: strict targeting expected future inflation with moderate nominal interest rate smoothing

1. The estimated model

Tractable characterization of the Canadian economy for monetary policy analysis.

(i) monopolistic competition and staggered prices in labor and product markets: NT, T $(= Td + X)$ and M,

(ii) labor and capital are mobile across sectors but sector-specific technology process,

(iii) traded goods are priced to market,

(iv) monetary policy represented by standard Taylor rule:

$$\log\left(R_t/R\right) = \varrho_R \log\left(R_{t-1}/R\right) + \varrho_\pi \log\left(\pi_t/\pi\right) + \varrho_y \log\left(y_t/y\right) + \varepsilon_{Rt},$$

(v) 8 shocks: common domestic (monetary policy, money demand, risk premium), sector specific (NT and T technology) and foreign (US output, inflation and nominal interest rate).

1. The Estimated Model

Bayesian method: prior according to reasonable calibration, then parameters updated to maximize the likelihood of the data given the model. Data: quarterly 1972q1-2003q4 for Canada.

Data most informative for

- different sectoral stickiness: W 5q$>$ P^N 3q$>$ P^T 2$\frac{1}{2}$q $>$ P^M 2q, N labor intensive
  - sticky P^M reflects low XR pass-through
  - Taylor rule: moderate IR smoothing ρ_R=0.46, inflation stabilization ρ_π=1.19, low output gap stabilization ρ_y=0.3
  - shocks: NT tech.shocks the more important, followed by monetary policy (also foreign) and risk premium shocks

2. Simple inflation stabilization rules

Compare alternative monetary policy reaction functions to the estimated Taylor rule

1. welfare gain = gain in households' long-run average utility given the estimated model (2nd-order approximation around steady state), expressed in percentage of lifetime consumption

2. unconditional implied volatility for main macro variables

We optimize over the reaction to price and output deviations.

2. Simple inflation stabilization rules

reacting to π and y: welfare gain (0.08 per cent permanent consumption) vs historical rule if ρ_π slightly higher and no reaction to output gap ($\rho_y = 0$). Big welfare losses if aggressive y stabilization.

reacting also to π^W: same $\rho_\pi = 1.2$ ($\rho_{\pi^W} = 0$ and $\rho_y = 0$). Aggressive π^W stabilization decreases welfare due to higher induced volatility.

reacting to π^N, π^{Td} and π^M: substantial welfare gain of aggressively targeting only π^N, (the more sticky sector) at the cost of substantially increased volatility.

Table 1: Welfare Implications of Alternative Monetary Policy Rules

Interest Rate rules	Average c_t	Average m_t	Average h_t	Average u_t	Welfare gain	1st level effect	2nd level effect
Historical rule $\hat{R}_t=0.46\hat{R}_{t-1}+1.19\hat{\pi}_t+0.31\hat{y}_t$	**0.5337**	**0.2497**	**0.3005**	**-0.7929**	**0.0000**	**0.0000**	**0.0000**
CPI inflation targeting $\hat{R}_t=0.46\hat{R}_{t-1}+1.20\hat{\pi}_t$	**0.5345**	**0.2558**	**0.3013**	**-0.7921**	**0.0799**	**0.1112**	**-0.0311**
Future CPI inflation targeting $\hat{R}_t=0.46\hat{R}_{t-1}+1.20\hat{\pi}_{t+1}$	**0.5349**	**0.2572**	**0.3018**	**-0.7918**	**0.1136**	**0.1549**	**-0.0410**
Non-tradables inflation targeting $\hat{R}_t=0.46\hat{R}+4.00\hat{\pi}_t^N$	**0.5413**	**0.7278**	**0.2929**	**-0.7833**	**0.9779**	**2.8793**	**-1.8403**
CPI level targeting $\hat{R}_t=0.46\hat{R}+0.20\hat{P}_t$	**0.5345**	**0.2500**	**0.3012**	**-0.7921**	**0.0834**	**0.0952**	**-0.0117**

Table 2: Aggregate Volatility Induced by Alternative Monetary Regimes

Interest Rate rules	σ_c	σ_m	σ_h	σ_u	σ_y	σ_π	σ_R
Historical rule $\hat{R}_t=0.46\hat{R}_{t-1}+1.19\hat{\pi}_t+0.31\hat{y}_t$	**0.0133**	**0.0552**	**0.0112**	**0.0226**	**0.0173**	**0.0077**	**0.0098**
CPI inflation targeting $\hat{R}_t=0.46\hat{R}_{t-1}+1.20\hat{\pi}_t$	**0.0163**	**0.0596**	**0.0128**	**0.0301**	**0.0301**	**0.0076**	**0.0126**
Future CPI inflation targeting $\hat{R}_t=0.46\hat{R}_{t-1}+1.20\hat{\pi}_{t+1}$	**0.0158**	**0.0595**	**0.0205**	**0.0277**	**0.0440**	**0.0140**	**0.0128**
Non-tradables inflation targeting $\hat{R}_t=0.46\hat{R}+4.00\hat{\pi}_t^N$	**0.0725**	**0.1718**	**0.0645**	**0.0974**	**0.1579**	**0.0389**	**0.0608**
CPI level targeting $\hat{R}_t=0.46\hat{R}+0.20\hat{P}_t$	**0.0150**	**0.0564**	**0.0102**	**0.0276**	**0.0268**	**0.0065**	**0.0108**

3. Including a price-level target

We include explicit reaction to deviations of the price-level from target path as in Batini&Yates(2003):

- No noticeable gain from price-level targeting or hybrid rule
- Welfare gain only if very little reacting monetary policy, $\rho_P = 0.2$ ($\Rightarrow$longer horizons for bringing price and inflation to target), but not higher volatility induced
- considering sectorial price-level target: only P^N targeting improves welfare but not as much as in the case of strict inflation targeting

Final exercise: forward-looking monetary policy

Monetary policy rule that reacts to expected future deviations of target variables⇒preferred specification of all:

- same strict inflation targeting coefficents, $\rho_{\pi}^{+1} = 1.2 (\rho_{\pi_W}^{+1} = 0$ and $\rho_{y}^{+1} = 0)$
- higher welfare gain with slightly more π and y variability but lower utility volatility

Results

- Welfare gain with respect to estimated Taylor rule if ρ_π slightly higher and no reaction to output gap ($\rho_y = 0$)
- Substantial gain if reacting only to π^N (the more sticky sector) but very high volatility
- No noticeable gain from price-level targeting or hybrid rule, only accepted with very little reacting monetary policy (longer horizons for bringing price and inflation to target)
- Preferred specification: strict targeting expected future inflation with moderate nominal interest rate smoothing
- PRELIMINARY, PRELIMINAIRE, PRELIMINAR, AOUALI!!!!!