NGDP Targeting under Fiscal Leadership: A Framework for China's Monetary-Fiscal Interaction

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May 2025

Motivation

- **Stagnant demand**: GDP growth slowing, inflation near 0%, interest rate at 1.4%—close to ZLB
  - **Demand-driven slowdown**: Current weakness reflects demand shocks, not supply constraints
- **No explicit policy rule**: PBoC lacks a clear target but the State Council has annual GDP growth rate targets
- **Weak coordination**: PBoC has limited independence; MoF remains passive during downturns
- **NGDP targeting as a solution**: Provides a rule-based anchor and coordinates fiscal-monetary policy

NGDP Targeting: Key Literature Insights

1. Critiques of Traditional Rules

- **Orphanides (2001-2003)**:
  - Real-time data on output gap and r^* is noisy.
  - Taylor rule performance deteriorates with mismeasurement.
- **McCallum (2000)**:
  - Interest-rate rules rely on latent natural rate assumptions.
  - In unstable environments, quantity-based rules are more robust.
  - Calls for return to monetarist anchors like base growth or NGDP paths.

2. NGDP Targeting: Theoretical and Empirical Support

- **Garín, Lester & Sims (2016):**
  - In NK model with sticky wages/prices, NGDP targeting $\approx$ output gap targeting in welfare.
  - Requires no unobservable gap estimates.
- **Beckworth & Hendrickson (2019):**
  - NGDP targeting linked to lower inflation volatility historically.

Policy Rules: Formulas and Comparison

1. **McCallum Rule (Quantity-based)**:

$$\Delta b_t = \Delta x^* + \gamma(\Delta x^* - \Delta x_{t-1})$$

Targets growth of monetary base to stabilize NGDP growth.

2. **Taylor Rule (Interest-rate-based)**:

$$i_t = r^* + \pi_t + \phi_\pi(\pi_t - \pi^*) + \phi_y(y_t - y^*)$$

Responds to inflation and output gaps—both difficult to estimate in real time.

3. **NGDP Targeting**:

$$ln(1 + r_t) = \phi_\pi(1 + \pi_t) + \phi_y ln(\frac{Y_t}{Y_{t-1}})(\text{Garín, Lester \& Sims(2016)})$$

$$r_t = \rho r_{t-1} + (1 - \rho)\Omega\Delta x_t + e_t^r(\text{Beckworth \& Hendrickson (2019)})$$

~~Potential Research Questions 1~~

- Does an NGDP Targeting policy rule explain PBoC behavior better than traditional inflation-targeting rules?
- Past papers (Burdekin & Siklos (2024), Girardin, Lunven & Ma (2017)) have shown that PBoC's policy rule is anti-inflation and follows both Taylor and McCallum rules to some extent.
- **Contribution**: Estimating a NGDP targeting rule using GMM or ? to see if it fits better than Taylor or McCallum rules. Maybe add a VAR model for impulse response analysis.

Potential Research Questions 2

- Can NGDP targeting outperform inflation targeting and coordinate stabilization efforts between the PBoC and MoF in a setting where one or both face institutional or economic constraints?
- Beckworth & Hendrickson (2019) incoporated NGDP targeting into a New Keynesian model found that it creates lower volatility in inflation than Taylor-type rules.
- **Contribution**: RANK model with ZLB constraint using Chinese data
  - Monetary rule: Taylor vs. NGDP targeting
  - Fiscal rule: Exogenous (Simple AR(1)) vs. Output gap -reactive (like Taylor rule) vs. NGDP targeting

Model Setup

- Monetary rule: Taylor vs. NGDP targeting
  - Level Targeting: $r_t = \phi_x(x_t - x^*)$
  - Growth Targeting: $r_t = \phi_x(\Delta x_t - \Delta x^*)$
  - Can also add other components like AR(1)
- Fiscal rule: Exogenous (Simple AR(1)) + Steady Level Spending vs. Output gap -reactive (like Taylor rule) vs. NGDP targeting
  - Output gap reactive: $g_t = \gamma_y(y_t - y^f)$
  - NGDP Level Targeting: $g_t = \gamma_x(x_t - x^*)$
  - NGDP Growth Targeting: $g_t = \gamma_x(\Delta x_t - \Delta x^*)$

Monetary-Fiscal Interaction in China

- In China, fiscal and monetary authorities (MoF and PBoC) interact strategically.
- Recent events (e.g., 1.1 trillion RMB profit remittance) highlight blurred institutional boundaries.
- Objective: model these interactions using game theory to understand outcomes under NGDP targeting.

Leeper (1991): Active vs. Passive Policy

- Defines monetary and fiscal regimes as **active** or **passive**.
- **Active monetary policy:** strong response to inflation
- **Passive fiscal policy:** adjusts to ensure intertemporal budget constraint holds
- Uniqueness of equilibrium depends on the mix:
  - (Monetary active, fiscal passive) $\Rightarrow$stable prices
  - (Both active/passive) $\Rightarrow$ possible indeterminacy

Dixit and Lambertini (2003)

- Monetary and fiscal authorities minimize separate loss functions:

$$L_{CB} = \frac{1}{2}(\pi - \pi^*)^2 + \frac{\lambda}{2}y^2$$

$$L_F = \frac{1}{2}(\pi - \pi^*)^2 + \frac{\beta}{2}y^2 + \frac{\gamma}{2}g^2$$

- Economy described by:

$$y = ag - br$$

$$\pi = \kappa y$$

- Equilibrium depends on timing:
  - Nash: each authority ignores externalities $\Rightarrow$ inflation bias

My Setup: Stackelberg Game (MoF Leads)

- Fiscal authority maximizes:

$$U_{\text{MoF}} = y - \frac{\gamma}{2} g^2 - \frac{\theta}{2} \pi^2$$

- PBoC minimizes:

$$L_{\text{PBoC}} = \frac{1}{2} \pi^2 + \frac{\lambda}{2} y^2$$

- Subject to:

$$y = ag - br, \quad \pi = \kappa y$$

- Solve by backward induction:
  1. PBoC best response $\Rightarrow r(g)$
  2. MoF chooses g anticipating $r(g)$

Equilibrium Intuition

- Under **fiscal leadership**, monetary policy accommodates spending $\Rightarrow$ inflation bias
- Chinese context: MoF may effectively lead due to treasury control, land finance, local incentives

NGDP Targeting Variant (Placeholder)

- Under NGDP targeting, both authorities aim to stabilize nominal income:

$$L_{\text{PBoC}} = \phi_{\text{pboc}}(y - y^*)^2$$
$$U_{\text{MoF}} = \phi_{\text{mof}}(y - y^*)^2$$

- Extensions can consider how fiscal leadership affects NGDP-targeting credibility

Possible Extensions

- Add local governments as strategic agents:
  - Nodes in a network
  - Invest in real estate vs. productive sectors
- Explain why stimulus flows disproportionately into real estate
- Link game outcome to fiscal rule in RANK model with NGDP targeting