Monetary Policy Rules When UIP Conditions and Policy Trilemma do not Hold: the Case of Nepal*

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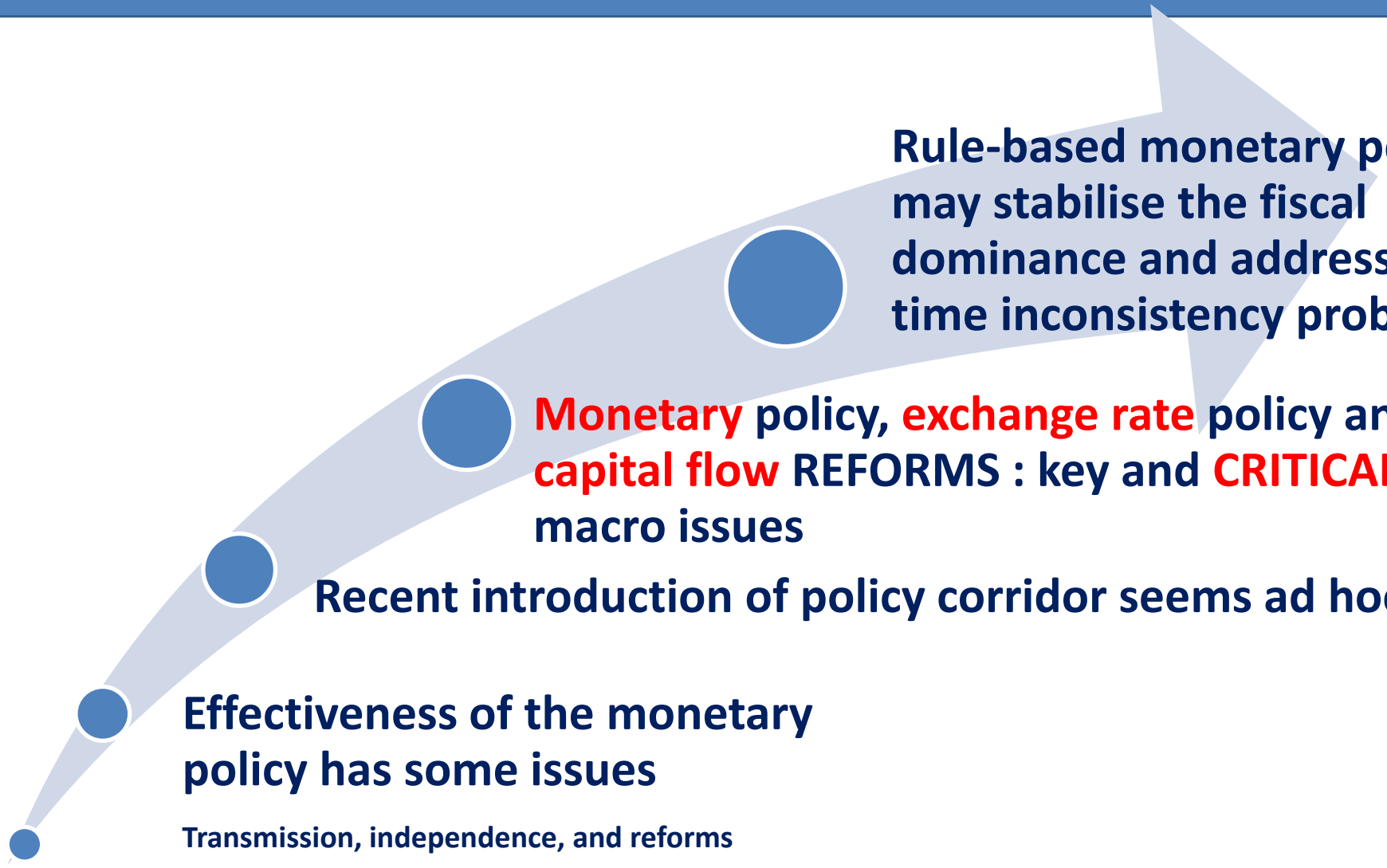
Presentation Outline

- Background
- Research objectives and summary gaps
- Analytical models
- Data
- Estimation and Findings
- Discussions/Policy Implications

Background


Rule-based monetary policy may stabilise the fiscal dominance and address time inconsistency problem
Monetary policy, exchange rate policy and capital flow REFORMS : key and CRITICAL macro issues
Recent introduction of policy corridor seems ad hoc
Effectiveness of the monetary policy has some issues
Transmission, independence, and reforms
Nepal adopts fixed exchange rate with India historically
Since 1950s, latest revisit in level of peg: 1993 February

Summary Research Gaps

- The implication of Taylor (1993) rule has asymmetric implications to economies
- Nepal has a unique economic/political/geographic characteristic that cannot replicate the existing findings
- Our earlier studies (Bhatta et al 2021a, Bhatta et al 2021b) confirm both the UIP and trilemma conditions do not exist in Nepal, that requires a re-designed policy rule

Research Objectives

i) explore the factors influencing the short-term interest rate;

ii) investigate whether the modified Taylor rule holds

iii) discuss the policy implications

Theoretical Context : 3 Foundations

ISLM Model

Keynesian economic theory

- **Mundell (1963) and Fleming (1962):** **Impossible Trinity**

Fisher Effect

International Fisher Effect:

- Interaction of monetary policy and exchange rate.

Uncovered Interest parity: $e_t^E - e_t = i_t - i_t^*$

Monetary Policy Rule

New Keynesian economics

Taylor rule: $i = \pi^* + r^* + \beta\,(\pi^e - \pi) + \chi\,(Y - \overline{Y})$

Modified Taylor Rule

Uncovered interest parity model

- Backward-looking strategy as $b_1 \Delta e_t$ and forward-looking strategy as $(1-b_1)(i_t - i_t^* - prem_t)$ (Berg et al. 2006a, 2006b)

$$e_{t+1} - e_t = b_1(e_t - e_{t-1}) + (1 - b_1)(i_t - i_t^* - \boldsymbol{prem_t}) + \varepsilon_t$$

Monetary policy reaction function (for free market) Berg et al. 2006a, 2006b

$$i_t = f_1 i_{t-1} + (1 - f_1)(i_t^n + f_2(\pi_t^e - \pi^T) + f_3 \hat{y}_t) + \varepsilon_t^i$$

Extended reaction function for Nepal :

- $\boldsymbol{i_t = c_1(\Delta e_{t+1} + i_t^* + prem_t) + (1 - c_1)}(f_1 i_{t-1} + (1 - f_1)(i_t^n + f_2(\pi_{t+1}^e - \bar{\pi}) + f_3 \hat{y}_t)) + \varepsilon_t^i$
  - If $\Delta e_{t+1} = 0$: i_t determined by i_t^*, and $i_t = i_t^* + prem_t$.
  - $\Delta \bar{e} = 0$: fixed exchange rate, inflation target consistent with the trend in the real exchange rate

Modified Taylor Rule

- c1 is the degree of control the central bank holds over the money market interest rate, higher value of c1 means a lower degree of control.
- Fixed exchange rate, $\Delta\bar{e}=0$, since rational market agents know that the exchange rate will not change in the future, indicating a forward-looking behaviour.
- **Long-run average value of inflation represented by $\bar{\pi}$ depends upon the foreign inflation, implying that $\bar{\pi} = \bar{\pi}^* - \Delta\bar{q}$.**
- $\Delta\bar{q}$ is the deviation in the REER equilibrium, such that $q_t = e_t + p_t^* - p_t$.
- i_t^n is the neutral nominal interest rate, which is obtained as a trend real interest rate plus model-consistent inflation expectations
- The inflation target is consistent with a trend in the real exchange rate as represented in our model by the coefficient $\bar{q}$, limiting the central bank's choice either controlling the exchange rate or the interest rate.
- **$\bar{\pi}$ in equation is replaced with $\bar{\pi}^* - \Delta\bar{q}$ during estimation.**

Modified Taylor Rule - Estimation

- Modified Taylor rule as discussed before ((Berg et al. 2006a, 2006b) and Bulir (2014) is further simplified into a testable format:
  - Simulated risk premium data for the 'prem' variable adopted from Bhatta et al (2021a), monthly data averaged for quarterly.
  - Based on the findings of Bhatta et al (2021b), we assigned the negligible weight of domestic economic conditions and substantial weight of foreign, as follows:

$$i_t = 0.9(\alpha\, i_t^* + \beta\, prem_t) + 0.1\big(\rho i_{t-1} + (1-\rho)(\gamma\, i_t^n + \delta\, \pi_{t+1}^e - \lambda\bar{\pi}^* + \Psi\Delta\bar{q} + \varphi\hat{y}_t)\big) + \varepsilon_t^i$$

EXTENSION

- adding Nepal's stock exchange index and broad money supply, following the approach of Castro (2011) and Hsing (2009).

$$i_t = 0.9(\alpha\, i_t^* + \beta\, prem_t) + 0.1\big(\rho i_{t-1} + (1-\rho)(\gamma\, i_t^n + \delta\, \pi_{t+1}^e - \lambda\bar{\pi}^* + \Psi\Delta\bar{q} + \varphi\hat{y}_t + \tau_1 M2 + \tau_2 Stock)\big) + \varepsilon_t^i$$

Data

- Quarterly time series data from 2000Q1 to 2020Q4
- Interest (policy) rate: 91- days T-bill assumed to be NRB's policy rate, same rate of India's taken
  - Belief: 91 days' T-bill rate can represent the closet trend in the absence of CB's policy rate
- Exchange rates: nominal is NEER and real is REER (REER is not inflation adjusted, but exogenous); taken from Darvas (2012)
- CPI, real GDP
- Risk premium: calibrated data adopted (from our earlier study is from Bhatta et al (2021a)

Modelling Technique : GMM

- Hansen (1982)'s Generalised method of moments(GMM) applied for estimation Addresses the endogeneity problem:
  - interest rate, the dependent variable, directly influences the risk premium and affects inflation and the exchange rate
  - feedback of the policy actions complex and interactive, also highlighted by Clarida et al. (1998).

$$Q(\alpha, \beta, \rho, \gamma, \delta, \lambda, \Psi, \varphi) = \left(\frac{1}{N}\sum_i z_i \varepsilon_i\right)' W \left(\frac{1}{N}\sum_i z_i \varepsilon_i\right)$$

  - Where, *W is a weighting matrix with* $W = \hat{S}^{-1}$ and $\hat{S} = \frac{1}{N}\sum_i \hat{\varepsilon}_i^2 z_i z_i'$
- Eight instruments included: lagged values of the variables, following the Clarida et al (1998)
  - Model is overidentified

Findings

Results

Long-term Coefficients		Estimates	Short-run (Smoothened) Coefficients	Estimates
i_t^*	α	0.223 (0.219)	(0.9) α	0.2007
$prem_t$	β	0.132 (0.092)	(0.9) β	0.1188
i_{t-1}	ρ	0.732*** (0.081)	(0.1) ρ	0.073***
i_t^n	γ	0.781*** (0.332)	0.1(1-ρ)* γ	0.021***
π_{t+1}^e	δ	-0.666** (0.336)	0.1(1-ρ)* δ	-0.018**
$\bar{\pi}^*$	λ	0.279* (0.158)	0.1(1-ρ)* λ	0.0075*
$\Delta\bar{q}$	Ψ	3.745** (1.689)	0.1(1-ρ)*Ψ	0.1004**
$\hat{y}_t$	φ	0.059** (0.027)	0.1(1-ρ)*φ	0.0016**
Wald χ^2		1444.9 (p-value: 0.00)		
Adj. R^2		0.8408		
Hansen's J Statistics		7.785 (p-value: 0.2543)		

Results: Extended Model

Long-term Coefficients		Estimates	Short-run Coefficients	Estimates
i_t^*	α	0.221 (0.213)	(0.9) α	0.1989
$prem_t$	β	0.105 (0.094)	(0.9) β	0.0945
i_{t-1}	ρ	0.732*** (0.069)	(0.1) ρ	0.0732***
i_t^n	γ	0.799** (0.332)	0.1 (1-ρ)*γ	0.021**
π_{t+1}^e	δ	-0.652* (0.343)	0.1 (1-ρ)*δ	-0.017*
$\bar{\pi}^*$	λ	0.257 (0.161)	0.1 (1-ρ)*λ	0.007
$\Delta\bar{q}$	Ψ	3.80** (1.83)	0.1 (1-ρ)*Ψ	0.102**
$\hat{y}_t$	φ	0.059** (0.027)	0.1 (1-ρ)*φ	0.002**
	τ_1	-0.078* (0.043)	0.1 (1-ρ)*τ_1	-0.002*
	τ_2	-0.0086 (0.0089)	0.1 (1-ρ)*τ_2	-0.0002
Wald χ^2		1782.4 (p-value: 0.00)		
Adj. R^2		0.843		
Hansen's J Statistics		7.651 (p-value: 0.2648)		

Results…

- Extended model: results obtained are similar to the earlier estimation
  - shows robustness and consistency of earlier results
  - We do not reject the null hypothesis for Hansen J statistics, ensuring instrument validity.
- To further validate the model and robustness check: two stages least squares (2SLS), model estimated.
  - Similar coefficient estimates obtained
- Risk premium's positive impact to interest rate confirms the earlier findings by Bhatta et al (2021a) but insignificant
  - A higher risk premium (positive value of the premium) means Nepal's interest rate should be higher than India's and vice versa
  - Premium is a simulated (unobserved), it is a control variable for the proposed reaction function
- Interest rate substantially explained by foreign factors
  - No direct impact of foreign interest rate but REER, with a similar finding of Mohanty and Klau (2005) and Kendall and Ng (2013),

Discussions

- REER appreciation may have a similar impact as of domestic inflation expectations in the monetary policy rule.
  - Nepal receives substantial remittance
  - Studies such as by Barajas et al. 2011; Hassan & Holmes 2013 showed remittances cause the REER to appreciate
  - Hien et al. (2019) confirm that the 'Dutch disease' effect appears only if the remittances are spent on consumption, which directly related Nepal
  - Remittances may have been accommodated via the REER
- The REER appreciation causes an increase in long-term rates but it would only be partially reflected due to the weak transmission channel
  - REER appreciation will further deteriorating the external trade competitiveness,
- The negative impact of inflation expectations against the Taylor (1993) principle
  - an outward-looking strategy must be considered while setting the interest rate to enhance the effectiveness of the monetary policy transmission.

Policy implications

- the policy rate should follow the reaction function like the one proposed in this study
  - helps to communicate the signals of inflation expectations to the market and guides the central bank's policy rate path.
- Being the most substantiated variable affecting the interest rate, the REER appreciation may have a similar impact to that of domestic inflation expectations in the monetary policy rule.
  - A sharp currency appreciation would have two effects: a rise in the interest rate and a loss of international competitiveness.
- Inflation-targeting monetary policy would not be feasible for Nepal, as explained by Suzuki (2019)
  - The role of inflation expectation is however may be fulfilled by the REER

Way Forward

- Nepal's benefits should arise from introducing a rule-based policy to enhance the policy effectiveness in the first phase.
  - A replacement of the discretionary policy with a rule prevents political influence, further strengthening institutional and operational independence and addressing the time inconsistency problem.
- When the future short-term interest rate can be best predicted using the REER, inflation targeting can be equivalent to exchange rate targeting (Svensson 1997).
  - An area to explore for Nepal would be an exchange rate targeting monetary policy.

THANK YOU

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