

Optimal Policy Design for a Small Open Tariff-Receiving Economy

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Abstract

This paper develops a small open economy New Keynesian DSGE model to assess the macroeconomic and welfare effects of foreign tariff shocks and alternative policy responses. The model incorporates both external tariffs and domestic retaliation, and is calibrated to Thai data from 2000 to 2025. Welfare is evaluated using consumption equivalent variation under three regimes: optimal monetary policy, retaliatory tariffs, and a mixed approach. The results show that optimal monetary policy, characterized by a strong response to inflation and no interest rate smoothing, improves welfare by stabilizing inflation. In contrast, retaliatory tariffs do not enhance welfare and instead amplify output losses and inflation volatility. Impulse response analysis indicates that tariff shocks reduce exports, output, and firm profits while raising inflation through cost-push effects. Overall, the findings suggest that small open economies should rely on domestic macroeconomic policy rather than retaliatory trade measures when responding to external tariff shocks.

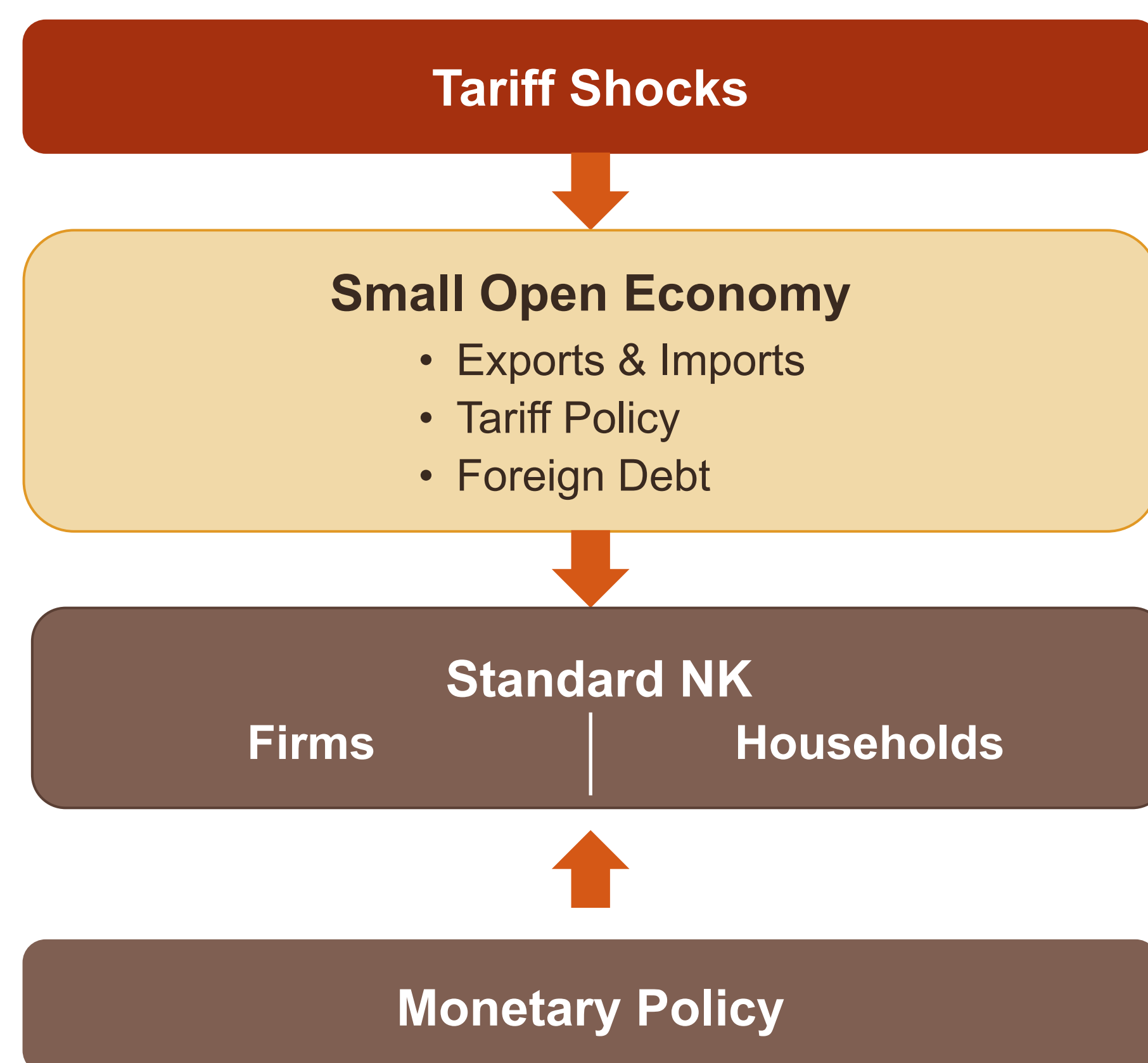
Introduction

- Tariffs have re-emerged as a major policy tool amid renewed trade tensions, exposing small open economies to external shocks.
- Key question:** how should a small open economy respond to a foreign tariff shock — with monetary policy, retaliatory tariffs, or a mix?
- We build a New Keynesian DSGE model with tariffs, calibrated to Thai data, and evaluate welfare across policy regimes.

The Model

- Small open economy NK-DSGE. Households (Galí & Monacelli 2005; Schmitt-Grohe and Uribe (2003)) choose consumption, labor, and foreign debt.
- Monopolistic firms set prices under Rotemberg adjustment costs, yielding a New Keynesian Phillips Curve.
- Two tariff tools: a foreign tariff on exports (τ^f) and a domestic tariff on imports (τ^h); the government rebates tariff revenue lump-sum.
- The central bank follows a Taylor rule with interest-rate inertia. UIP includes a debt-elastic risk premium (Schmitt-Grohé & Uribe 2003).

Model Structure



Export & Import Mechanics

(1) Import affected by Import Tariff

$$S_t(1 + \tau_t^h) = \frac{1 - \omega}{\omega} \left(\frac{c_t^h}{c_t^f} \right)^{\frac{1}{\gamma}}$$

(2) Export affected by Foreign Tariff

$$c_t^* = \left[\frac{(1 + \tau_t^f) P_t^h}{X_t P_t^*} \right]^{-\varepsilon^*} M$$

Policy Equations

(1) Retaliatory Import Tariff Policy

$$\tau_t^h = \varphi^{\tau_f} \tau_t^f$$

(2) Taylor Rule

$$i_t = \rho i_{t-1} + (1 - \rho) \left(\bar{i} + \varphi_{\pi} \pi_t + \varphi_y \frac{(y_t - \bar{y})}{\bar{y}} \right) + \varepsilon_t^i$$

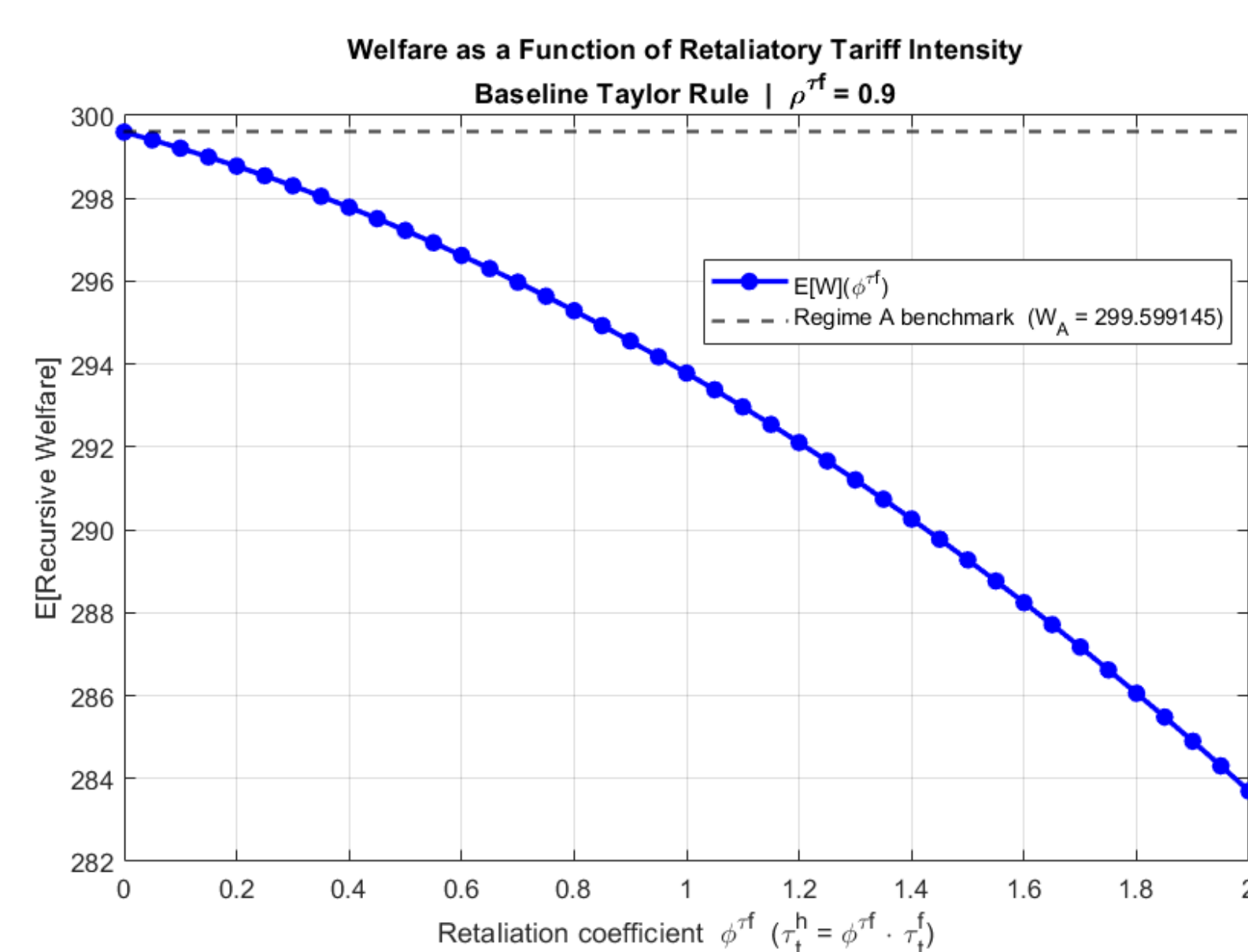
Calibration & Estimation

- Thailand proxy; quarterly data 2000:I–2025:II. Three-stage strategy following Burlon et al. (2024).
- Stage 1** – Calibrate conventional NK parameters ($\sigma=2.18$, $\varepsilon=6$, $\psi=3$, $\gamma=2$, $\varepsilon^*=3$, $\chi=0.001$; Taylor $\rho=0.8$, $\varphi_{\pi}=1.5$, $\varphi_y=0.5$).
- Stage 2** – Estimate to match steady-state targets ($\beta=0.995$, $i_{ss} = 2\%$ (annual); $\omega=0.523$, $c_{ss}^h/y_{ss} = 54.8\%$).
- Stage 3** – Calibrate price-adjustment cost and four shock variances to match second moments and volatility ratios.

Welfare & Optimal Policy

- Welfare is measured by consumption equivalent variation (CEV) under three policy rules: optimal monetary policy, retaliatory tariffs, and a mixed approach.
- Optimal monetary policy** — a strong inflation response with no interest-rate smoothing — raises welfare by 0.373% of consumption.
- Retaliatory tariffs** yield no welfare gain (CEV = 0); the mixed rule reduces to optimal monetary policy.

Expected welfare under different degrees of tariff retaliation

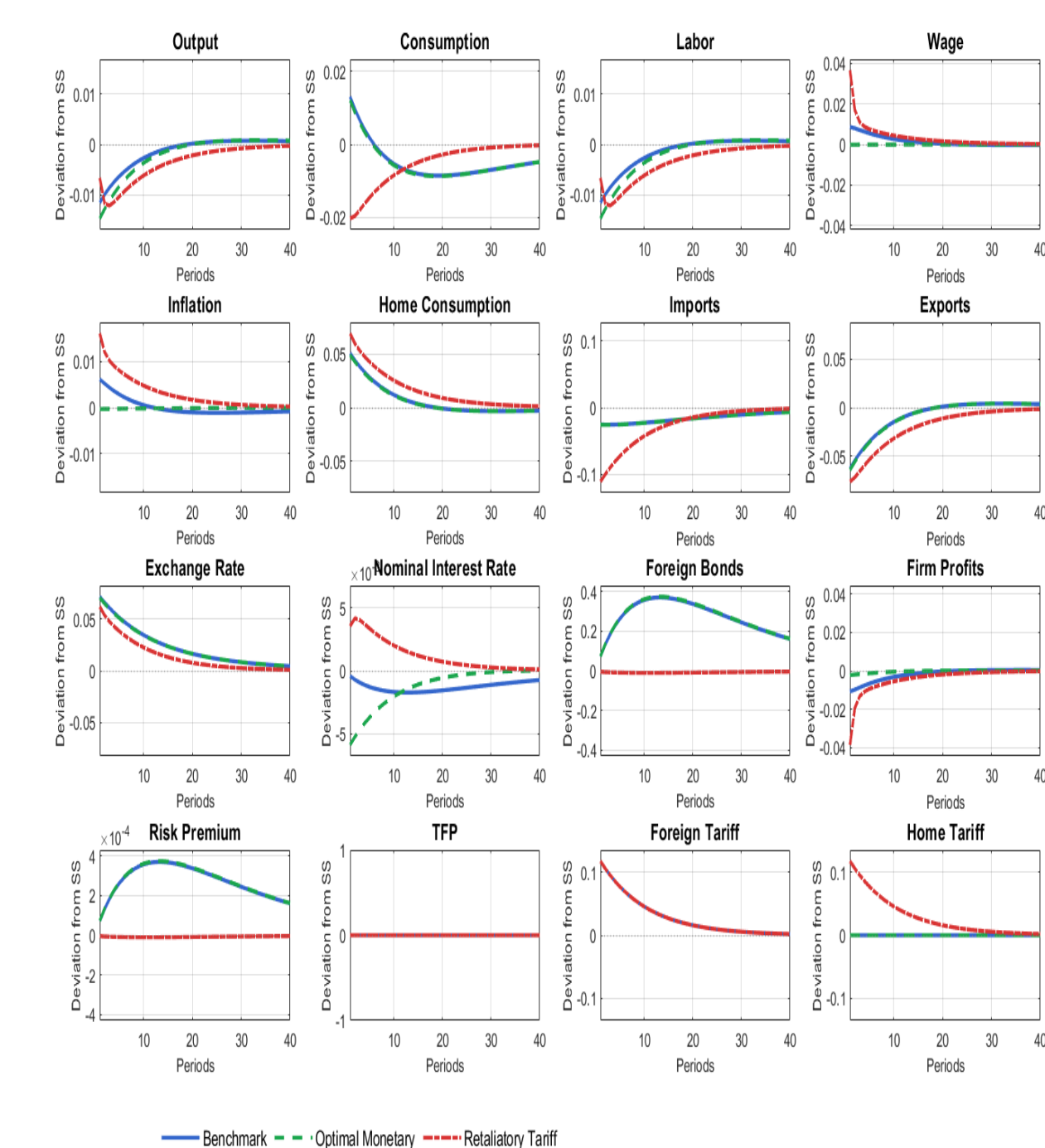


Optimal Policy Coefficients

Rules	φ_{π}	φ_y	ρ	φ^{τ_f}	CEV (%)
A: benchmark	1.5	1.0	0.8	0.0	0.0
B: monetary	5.0	0.3	0.0	0.0	0.37
C: tariff	1.5	1.0	0.8	0.0	0.0
D: mixed	5.0	0.3	0.0	0.0	0.37

Impulse Responses

- A foreign tariff shock reduces exports, output, and firm profits, and raises inflation through cost-push effects.
- The exchange rate depreciates, raising import prices; households substitute toward domestic goods.
- Optimal monetary policy stabilizes inflation by cutting rates more sharply, cushioning the output decline.



Conclusion and Further Research

- Small open economies should rely on domestic monetary policy, not retaliatory tariffs, to respond to foreign tariff shocks.
- Retaliation amplifies output losses and inflation volatility without improving welfare.
- Future research could extend this framework by incorporating financial frictions and macroprudential policy tools, allowing for a more comprehensive assessment of how central banks can respond to external shocks while balancing macroeconomic and financial stability objectives.

Regime	E[Welfare]	CEV lambda (%) (10e-4)
A: No Policy (benchmark)	-41.1897	---
B: Optimal Monetary Only	-40.9711	4.2577
C: Optimal Retaliatory Tariff	-41.1099	4.2542
D: Monetary + Tariff (joint)	-40.9711	4.2577
E: Monetary + CAR (no tariff)	-37.9443	4.2614
F: Monetary + LTV (no tariff)	-39.2179	4.2606
G: Monetary + CAR + LTV (no tariff)	-37.9443	4.2614

References

- Galí, J. and T. Monacelli (2005). Monetary Policy and Exchange Rate Volatility in a Small Open Economy. Review of Economic Studies.
- Jeanne, Olivier and Jeongwon Son (2024), To what extent are tariffs offset by exchange rates?
- Burlon, L. et al. (2024). The Optimal Quantity of CBDC in a Bank-Based Economy