TRADE LIBERALIZATION, MACROECONOMIC ADJUSTMENT AND WELFARE: UNIFYING TRADE AND MACRO MODELS

Ehsan U. Choudhri, Hamid Faruqee, and Stephen Tokarick

Effects of Trade Liberalization

Trade Models

- Concerned with long-run effects
- Nominal rigidities are absent

Macro Models

- Focus on short-run effects
- Nominal rigidities play an important role
- Short-run adjustment depends on monetary policy and can lead to unfavorable conditions
- Welfare implications not explored in early macro models

Need for an Integrated Framework

- In measuring the effect of trade liberalization on welfare, an integrated framework is needed to take both short- and long-run adjustment into account

- Trade and macro models are getting closer

- But some important differences remain between the two types of models

- This paper uses a hybrid model that captures key features of the two approaches

Issues Addressed in the Paper

- Why does the short-run (macro) adjustment to trade liberalization differ from the long-run adjustment?

- How does monetary policy influence short-run adjustment?

- What is the welfare cost of macro adjustment, and how large is this cost in relation to long-term gains?

- What policy action can reduce macro adjustment costs?

Basic Setup

- Two countries: a small home and a large foreign country

- Two goods, *M* and *X*, use labor and good-specific capital

- Capital endowments are fixed (as in trade models)

- Labor supply is variable (as in macro models).

- Monopolistic competition in goods and labor markets

- Changes in wages and prices are subject to adjustment costs

- Unrestricted International borrowing or lending

Utility and Consumption

$$U_t = \sum_{s=t}^{\infty} \beta^{s-t} u(C_s, L_s), \qquad u_s(C_s, L_s) = \left(\frac{C_s^{1-\rho}}{1-\rho} - \frac{\psi L_s^{1+\mu}}{1+\mu} \right)$$

$$C_t = \left[\chi_M^{1/\eta} C_{M,t}^{(\eta-1)/\eta} + \chi_X^{1/\eta} C_{X,t}^{(\eta-1)/\eta} \right]^{\eta/(\eta-1)}$$

$$C_{T,t} = \left[\chi_{TH}^{1/\theta_T} C_{TH,t}^{(\theta_T-1)/\theta_T} + \chi_{TF}^{1/\theta_T} C_{TF,t}^{(\theta_T-1)/\theta_T} \right]^{\theta_T/(\theta_T-1)}, T = M, X$$

$$C_{TH,t} = \left[\int_0^1 C_{TH,t}(h)^{(\varepsilon_T-1)/\varepsilon_T} dh \right]^{\varepsilon_T/(\varepsilon_T-1)}, h \in [0,1]$$

$$C_{TF,t} = \left[\int_0^1 C_{TF,t}(f)^{(\varepsilon_T-1)/\varepsilon_T} df \right]^{\varepsilon_T/(\varepsilon_T-1)}, f \in [0,1]$$

Production

$$Y_{M,t} = \left[\alpha_M^{1/\sigma} L_{M,t}^{(\sigma-1)/\sigma} + (1-\alpha_M)^{1/\sigma} K_{M,t}^{(\sigma-1)/\sigma} \right]^{\sigma/(\sigma-1)}$$

$$Y_{X,t} = \left[\alpha_X^{1/\sigma} L_{X,t}^{(\sigma-1)/\sigma} + (1-\alpha_X)^{1/\sigma} K_{X,t}^{(\sigma-1)/\sigma} \right]^{\sigma/(\sigma-1)}$$

$$K_{M,t} = \bar{K}_{M,t}, \quad K_{X,t} = \bar{K}_{X,t}$$

$$L_{M,t} = \left[\int_0^1 L_{M,t}(l)^{(\varepsilon_L-1)/\varepsilon_L} dl \right]^{\varepsilon_L/(\varepsilon_L-1)},$$

$$L_{X,t} = \left[\int_0^1 L_{X,t}(l)^{(\varepsilon_L-1)/\varepsilon_L} dl \right]^{\varepsilon_L/(\varepsilon_L-1)}, l \in [0,1]$$

$$L_t = L_{M,t} + L_{X,t}$$

Optimization

- Households choose consumption and set the wage rate to maximize lifetime utility
- Wage adjustment costs are

$$AC_{W,t}(l) = \frac{\omega_W}{2} \left(\frac{W_{L,t}(l)}{W_{L,t-1}(l)} - 1 \right)^2$$

- Firms set prices for home and foreign markets to maximize the present discounted value of profits
- Prices for both markets are set in terms of the home currency
- Price adjustment costs are

$$AC_{T,t}(h) = \frac{\omega_P}{2} \left(\frac{P_{TH,t}(h)}{P_{TH,t-1}(h)} - 1 \right)^2 , \quad T = M, X ,$$

Monetary Policy Regimes

Fixed Exchange Rates:

$$S_t = \bar{S}$$

Flexible Exchange Rates:

$$P_t = \bar{P}$$

Interest Rate rule (Flexible Price Level Targeting)

$$R_t = \bar{R} + \delta \log(P_t / \bar{P}), \quad \delta > 0$$

Parameterization

- We calibrate the model for a small emerging economy

- Home tariffs equal 20% , foreign tariffs equal 10%

- Key parameter values:

  Utility Parameters: $1/\rho = 0.5, 1/\mu = 0.25$

  Substitution Elasticities:
  $\eta = 3.0, \theta_M = \theta_X = 6.0, \varepsilon_M = \varepsilon_X = \varepsilon_L = 8.0$

  Technology Parameters: $\sigma = .9, \alpha_M = .61, \alpha_X = .76$

  Adjustment Costs: $\omega_P = \omega_W = 800$

Quantitative Analysis

Experiment:

- A unilateral reduction of home tariffs from 20% to 10%

Macroeconomic Adjustment:

- Examine the dynamic response of model variables to tariff reduction under pure fixed and flexible exchange rates

- Compare responses in the baseline model with those in a model with no nominal rigidities ($\omega_P = \omega_W = 0$)

Welfare:

- Estimate the total effect

- Decompose the total effect into steady-state and transitional effects
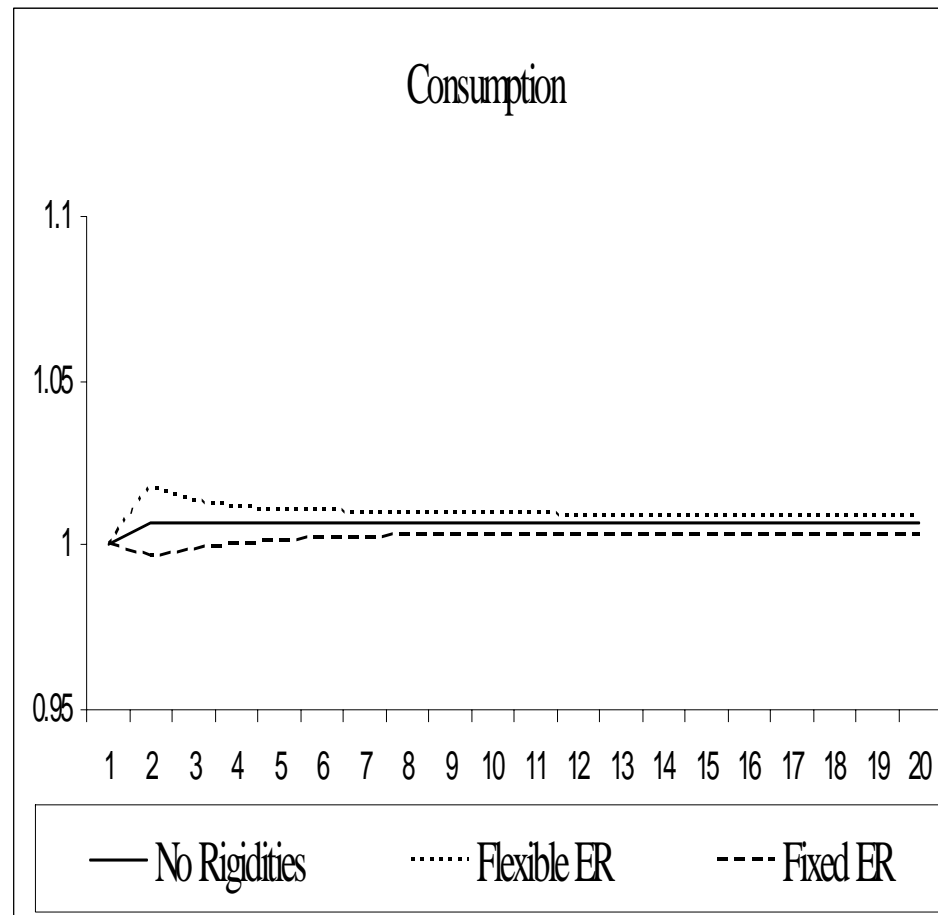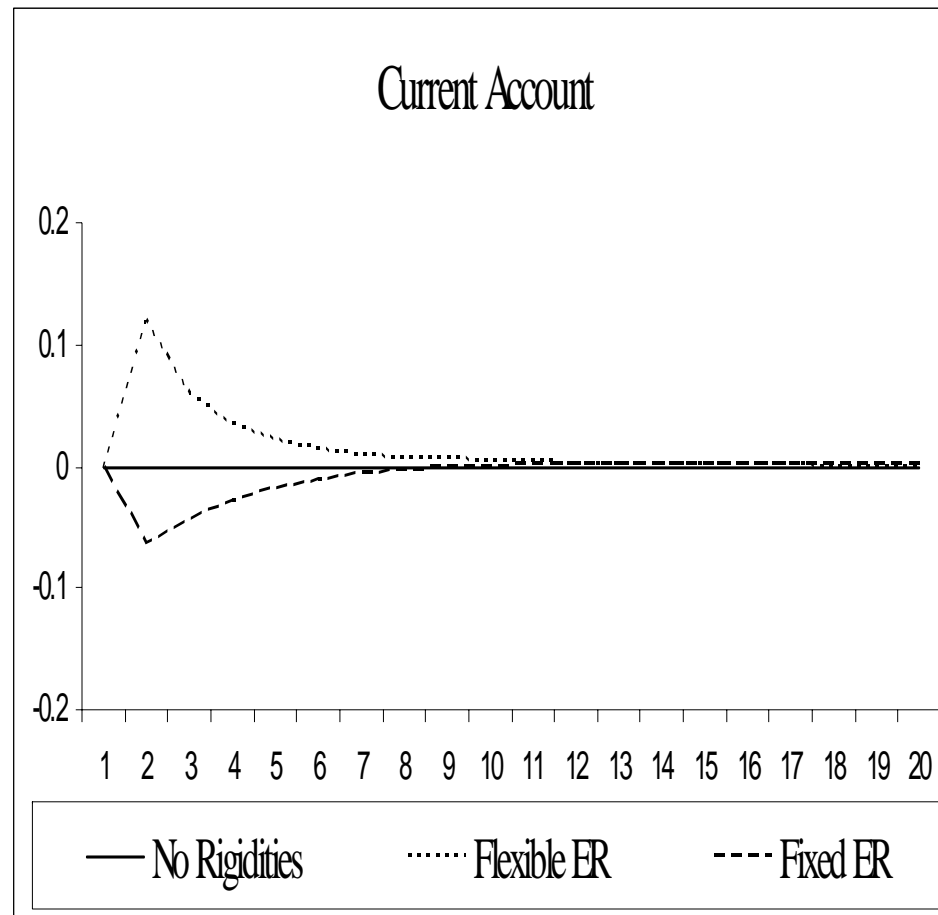
Dynamic Response of Output
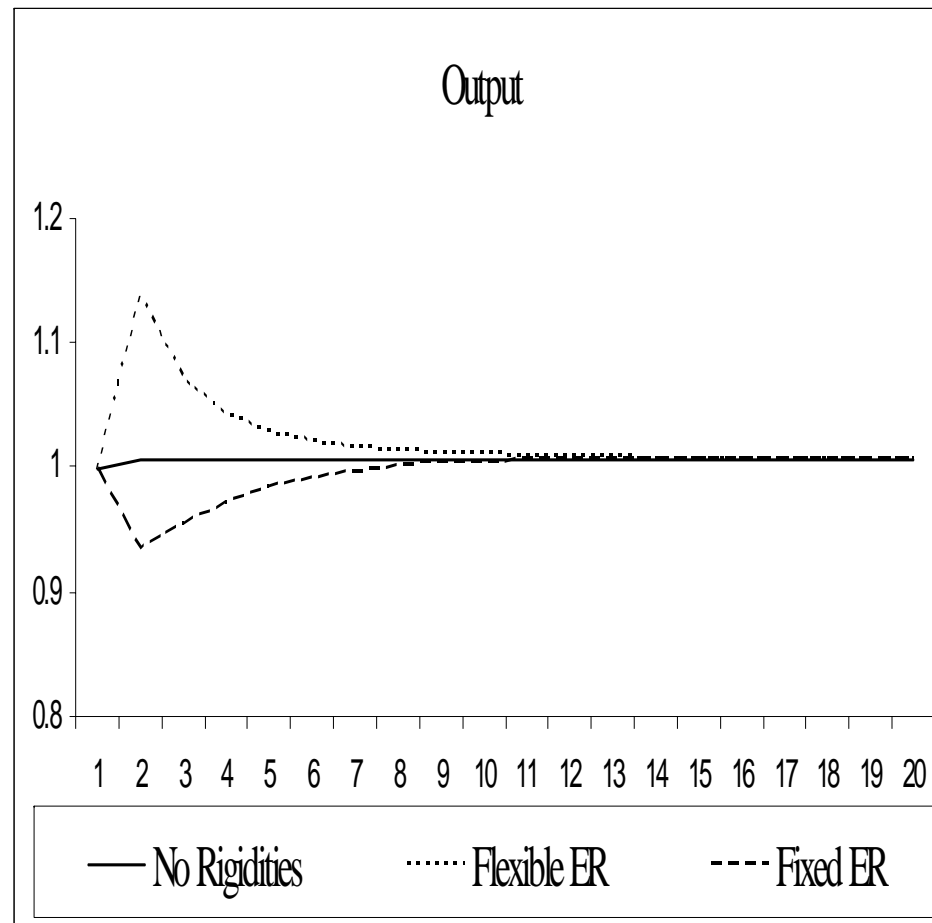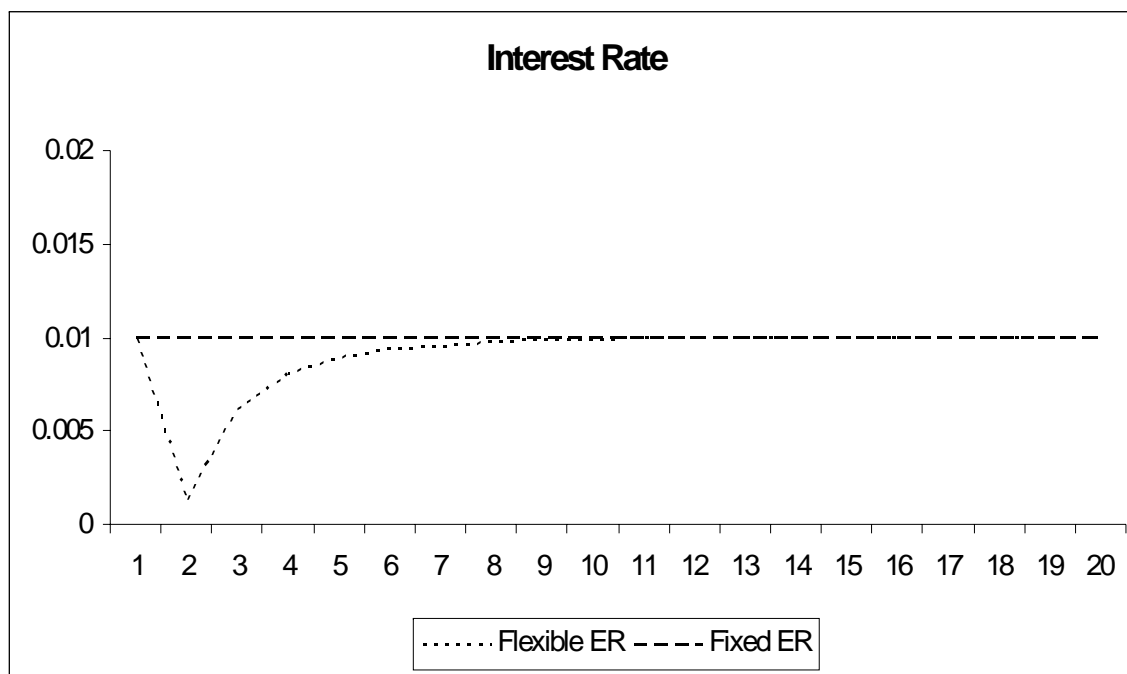
Dynamic Response of Employment

Dynamic Response of Consumption

Dynamic Response of the Current Account

Dynamic Response of the Interest Rate

Total Welfare Effect

- Use an equivalent-variation index

- Total welfare effect (γ): the constant amount (as a fraction of initial steady-state consumption) that needs to be given to households to make them indifferent between the initial steady state and the new state (including transition)

$$\sum_{s=0}^{\infty} \beta^s u[(1+\gamma)\bar{C},\bar{L}] = \sum_{s=t_0}^{\infty} \beta^{s-t_0} u(C_s, L_s)$$

A bar denotes initial steady state value

Steady-State and Transitional Effects

- Steady-state welfare effect (γ_{SS}): the constant amount (as a fraction of initial steady-state consumption) that needs to be given to households to make them indifferent between the initial steady state and the new steady state

$$u[(1+\gamma_{SS})\bar{C},\bar{L}] = u(\tilde{C},\tilde{L})$$
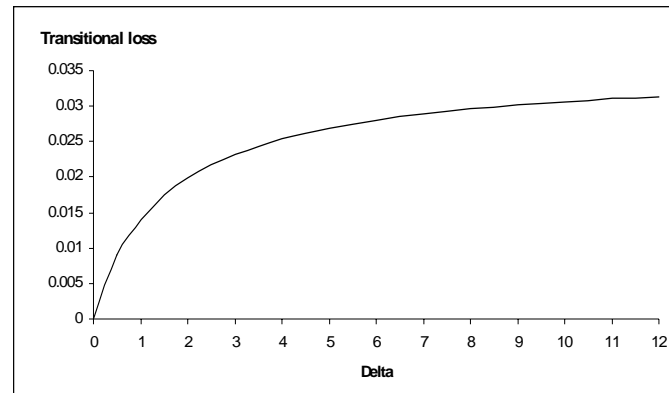
A tilde denotes new steady state value

- Transitional welfare effect (γ_{TR}) is determined residually

$$\gamma = \gamma_{TR} + \gamma_{SS}$$

Welfare Effects of Trade Liberalization

	Total Effect (%)		Transitional Effect (%)		Steady-State
	Fixed ER	Flexible ER	Fixed ER	Flexible ER	Effect (%)
Baseline Model	0.32972	0.34061	-0.04672	-0.03583	0.37643
Variation 1	0.40156	0.44428	-0.05909	-0.01637	0.46065
Variation 2	0.30710	0.32511	-0.04137	-0.02335	0.34847

Appropriate Interest Rate Response

Transitional loss

0.035	
0.03	
0.025	
0.02	
0.015	
0.01	
0.005	
0	

0   1   2   3   4   5   6   7   8   9   10   11   12

Delta

- For large values of δ, dynamic response of real variables under the interest rate rule is close to that under pure flexible exchange rates
- As δ decreases, the path of real variables moves towards the no-nominal-rigidities path

Sensitivity Analysis

Variations in ρ, μ and ε_L

- These variations have little effect on the steady-state welfare measure
- The transitional loss responds differently under fixed and flexible exchange rates, but remains small
- A decrease in δ always reduces the transitional loss
- The transitional loss is generally smaller under flexible exchange rates, but varies over a wider range

Variations in ω_W and ω_P

- An increase (decrease) in these parameters raises (lowers) the transitional loss
- The loss increases in δ more rapidly under flexible than under fixed exchange rates but remains small under both regimes.

No International Capital Mobility

- Interesting to examine the cost of macroeconomic adjustment for a financially-closed economy

- Without international borrowing, consumption must match the output response

- Under fixed exchange rates, there is a significant initial decrease in consumption (because of output decline) in response to tariff cuts

- The reduction in consumption causes considerable transitional loss that offsets much of the long-run gain

- Alternative monetary policies can still prevent large transitional losses

Conclusions

- Macroeconomic adjustment to tariff reduction causes a short-run loss that tends to be higher under fixed than flexible exchange rates

- The short-run loss is small relative to the long-run gain from tariff cuts

- Macroeconomic adjustment costs can be avoided by appropriate monetary policy