

The Macroeconomic Effects of Tariffs

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Introduction

- Tariffs are common **international trade** policy tool
 - terms of trade manipulation (Bagwell & Staiger, 2002)
 - political economy of protection (Grossman & Helpman, 2001)
 - beggar-thy-neighbor policy
 - WTO mechanism to internalize the negative external effects

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 - beggar-thy-neighbor policy
 - WTO mechanism to internalize the negative external effects
- Can tariffs also be a **macroeconomic** policy tool?
 - to improve current account?
 - to manipulate exchange rate?
 - to shift (cyclical or secular) output gap abroad?

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- **However:** Lerner symmetry does **not** hold under sticky prices
 - ① Fiscal devaluations (Farhi, Gopinath & Itskhoki 2014)
 - ② BAT and VAT (Barbiero, Farhi, Gopinath & Itskhoki 2019)
 - ③ Output gap shifting in liquidity traps (Jeanne 2018)

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Complex macroeconomic effects outside the case of neutrality
- Special case: fixed exchange rate regime \Rightarrow fiscal devaluation

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(cross-section LR variation for tariffs vs volatile time-series for ER)
 - different general equilibrium comovement

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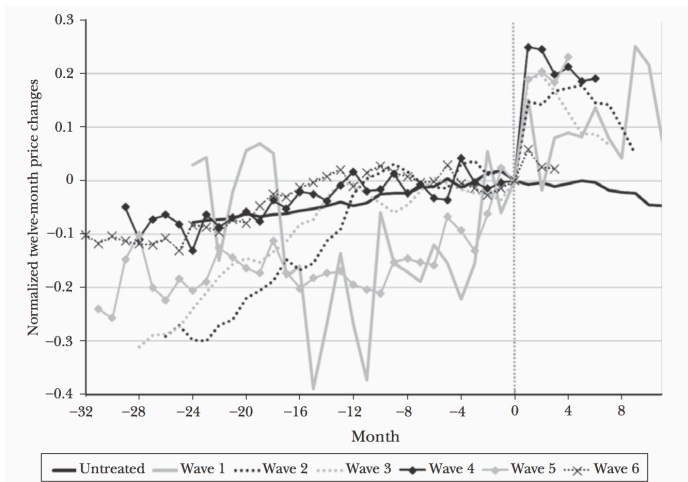
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(cross-section LR variation for tariffs vs volatile time-series for ER)
 - different general equilibrium comovement
- For United States, a case for DCP assumption in the SR:
 - ① Border prices are sticky in dollars
 - ② Pre-tariff for imports (and after-subsidy for exports)
- Consistent evidence from Trump tariffs
(Amiti, Redding & Weinstein 2019, Fajgelbaum, Goldberg, Kennedy & Khandelwal 2019, Cavallo, Gopinath, Neiman and Tang 2019)

Empirical Evidence on Pass-through

Amiti, Redding & Weinstein 2019 (ARW)

Figure 4

Twelve-Month Proportional Change in Import Prices by Tariff Wave



Simple Macro Model of Tariffs

- Households:

$$\max \frac{1}{1-\sigma} C^{1-\sigma} - \frac{1}{1+\varphi} L^{1+\varphi} \quad \text{s.t. } PC \leq WL + \Pi - T + B^p$$

— special log-linear case: $\sigma = 1$ and $\varphi = 0$

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- Cobb-Douglas demand:

$$C = \left(\frac{C_H}{1-\gamma} \right)^{1-\gamma} \left(\frac{C_F}{\gamma} \right)^\gamma \quad \Rightarrow \quad P = P_H^{1-\gamma} P_F^\gamma$$

$$C_H = (1-\gamma) \frac{PC}{P_H} \quad \text{and} \quad C_F = \gamma \frac{PC}{P_F}$$

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- Production and goods market clearing:

$$Y = AL = C_H + C_H^*$$

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cont'd

- Profits (with import tariff τ_m and export subsidy σ_x):

$$\Pi = P_H C_H + (1 + \sigma_x) \mathcal{E} P_H^* C_H^* - WL,$$

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$$T + TR = B^g, \quad TR = \frac{\tau_m}{1 + \tau_m} P_F C_F - \varsigma_x \mathcal{E} P_H^* C_H^*$$

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- Net Foreign Assets (by currency) and budget constraint:

$$B^P + B^g = B + \mathcal{E} B^* = -NX, \quad NX = \mathcal{E} P_H^* C_H^* - \frac{P_F C_F}{1 + \tau_m}$$

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- Wage setting (Calvo parameter θ_w):

$$W = \bar{W}^{1-\theta_w} [\mu_w PC^\sigma L^\varphi]^{\theta_w}$$

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$$P_F = \left[\bar{P}_F^* \mathcal{E}^{\iota_m} (1 + \tau_m)^{\delta_m} \right]^{1-\theta_p} \left[\eta_p^* \frac{W^*}{A^*} \mathcal{E} (1 + \tau_m) \right]^{\theta_p}$$

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- **Assumption:** no markup or productivity effects from tariffs (Amiti, Itskhoki & Konings 2019, ARW 2019, Baqaee & Farhi 2019)

Exchange Rate and Neutrality

- **Result 1:** Equilibrium exchange rate

$$\mathcal{E} = \frac{\frac{1}{1+\tau_m} M - B/\gamma}{M^* + B^*}$$

- follows directly from the intertemporal budget constraint (see generalization in Itskhoki and Mukhin 2019)

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- **Result 2:** Border adjustment neutrality

If (i) $\tau_m = \sigma_x$, (ii) M and M^* s.t. $P = P^* = 1$, (iii) $B = 0$,
(iii) $\iota_x = \delta_x$ and $\iota_m = \delta_m$, then $\mathcal{E}(1 + \tau_m) = \mathcal{E}(1 + \sigma_x) = \text{const}$
and macro allocations do not change with τ_m .

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- **Result 3:** Fiscal Devaluations

Macro allocations are equivalent under any \mathcal{E} and $\tau_m = \sigma_x$

such that
$$\mathcal{E}(1 + \tau_m) = \frac{M}{M^* + B^*/\gamma},$$

hence the effects of $\mathcal{E} \uparrow$ can be achieved with $\tau_m, \sigma_x \uparrow$

Tariffs under Flexible Prices

- Flexible prices and wages ($\theta_p = \theta_w = 1$), no NFA ($B = B^* = 0$):

$$W = M, \quad P_H = P_H^* \mathcal{E}(1 + \sigma_x) = \frac{M}{A} \quad \text{and} \quad P_F^* = \frac{P_F}{\mathcal{E}(1 + \tau_m)} = \frac{M^*}{A^*}$$

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- Monetary policy $P = P^* = 1$ implies

$$\begin{aligned} e &= -\hat{\tau}_m + (m - m^*), \\ p &= (1 - \gamma)p_H + \gamma p_F = (1 - \gamma)m + \gamma(m^* + e + \hat{\tau}_m) = 0, \\ p^* &= (1 - \gamma)p_F^* + \gamma p_H^* = (1 - \gamma)m^* + \gamma(m - e - \hat{\sigma}_x) = 0 \end{aligned}$$

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$$s = (p_F - e - \hat{\tau}_m) - p_H^* = -(\hat{\tau}_m - \hat{\sigma}_x),$$

$$c = y^* = 0,$$

$$c^* = y = -\gamma(\hat{\tau}_m - \hat{\sigma}_x) < 0.$$

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- 1 improvement in terms of trade shifts DWL of tariff to foreign
- 2 reduce employment at home (\sim welfare gain in the model)
- 3 effects proportional to $\gamma \times (\hat{\tau}_m - \hat{\sigma}_x)$

Tariffs under Sticky Wages (\propto PCP)

- Sticky wages $\theta_w < 1$ and flex prices $\theta_p = 1$

$$w = \theta_w m, \quad w^* = \theta_w m^*, \quad p_F = \theta_w m^* + \overbrace{e + \tau_m}^{m - m^* > 0}$$

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- Monetary policy $P = P^* = 1$ now $\Rightarrow m^* < m < 0$

$$c = m \propto -(1 - \theta_w)\gamma\hat{\tau}_m < 0,$$

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- 1 in addition to DWL, the negative shock from tariff creates an output gap in both countries, shifted more towards foreign
- 2 LCP case if more favorable for home and less for foreign
- 3 optimal monetary policy: lean against the wind?

Tariffs under Sticky Prices

- With $w = m$ and $w^* = m^*$, prices are given by:

$$p_H = \theta_p m,$$

$$p_H^* = \theta_p(m - e) - (1 - \theta_p)\iota_x e,$$

$$p_F^* = \theta_p m^*,$$

$$p_F = \theta_p(m^* + e + \tau_m) + (1 - \theta_p)[\iota_m e + \delta_m \tau_m].$$

- Consider DCP: $\iota_x = \delta_m = 1$ and $\iota_m = \delta_x = 0$
- In the limit of fully sticky prices ($\theta_p = 0$, short run):

$$p_F = \tau_m > 0 \quad \text{and} \quad p_H^* = -e > 0.$$

- 1 Tariff under DCP leads to $m, c, y < 0$ in both countries — global recession (cf. Gopinath et al. 2019, Mukhin 2019)

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- Tariffs lead to appreciation, which undoes the direct effect of tariff on trade deficit
- Tight monetary policy leads to a tariff-induced recession, reducing global production and consumption
- Optimal monetary accommodation/response to tariffs?