

Parallel Trade Policy in General Equilibrium

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What is Parallel Trade?

«Parallel trade occurs when a good protected by a patent, copyright, or trademark, having been legally purchased in one country, is exported to another without the authorization of the local owner of the intellectual property rights in the importing market»

— Maskus (2000)

⇒ Exploit price differences across markets, which are due to e.g. pricing-to-market or price controls

Institutional Context

- Different exhaustion regimes

Table 1: Countries by Patent Exhaustion Regime

National	Regional	International	
Australia	EU	Canada	China
Brazil		Chile	India
Indonesia		Japan	USA
Mexico		Singapore	Vietnam

Note: Own visualisation based on Calboli (2022); Maskus (2000). The list is non-exhaustive.

Research Question

- Parallel trade – or threat thereof – is important in reality, but rarely present in models of international trade
- Foellmi, Hepenstrick, Zweimüller (2018) based on Simonovska (2015) estimate that up to 45% of trade volume is price-constrained (especially within EU)

⇒ Our contribution:

- Welfare implications of parallel trade in general equilibrium
- Interaction of tariffs & parallel trade policy

Related Literature

- Pricing-to-Market

[Krugman (1986); Alessandria and Kaboski (2011); Gopinath et al. (2010); Fitzgerald and Haller (2014); Föllmi et al. (2018); Atkeson and Burstein (2008)]

- International Arbitrage & Parallel Trade

[Malueg and Schwartz (1994); Grossman and Lai (2008); Li and Maskus (2006); Roy and Saggi (2012); Dubois and Sæthre (2020); Dubois et al. (2022); Goldberg (2010)]

Related Literature

- Roy and Saggi (2012): 0-1 preferences, duopoly with price competition, no firm entry
 - Rich country has incentive to forbid parallel trade if high inequality
 - Poor country always prefers no parallel trade

⇒ Innovation: allow for firm entry & trade costs
- Föllmi, Hepenstrick & Zweimüller (2018) : 0-1 preferences, monopolistic competition with firm entry
 - When allowing PT, some firms abstain from exporting due to arbitrage threat

⇒ Innovation: allow for parallel trade policy choice

General Setup

North-South model of international trade

- Supply side: Krugman model (1986)
 - a: labour productivity
 - F: fixed costs
 - τ : trade costs (iceberg type)
- Demand side: nonhomothetic preferences
 - L: labour endowment, assume that $L > L^*$
 - $\mathcal{P}$: population
- Notation: Asterisk * denotes variables in South

Demand Side

- Preferences are 0-1 $\Rightarrow$ consumption is binary choice:

$$U = \int_{\Omega} c(j) dj, \quad \text{with } c(j) \in \{0, 1\}$$

- Utility maximisation yields

$$c(j) = 1 \quad \text{if } 1 \geq \lambda p(j)$$

$$c(j) = 0 \quad \text{if } 1 \leq \lambda p(j)$$

- Preferences ensure pricing-to-market behavior by firms, by fully exploiting differences in willingness to pay
- Aggregate demand given by population size

Demand Side

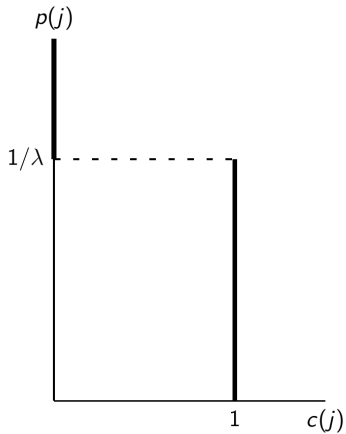


Figure 1: Individual demand function

Parallel Trade

- π : enforcement of intellectual property right
- $\pi = 0$: IPR cannot be enforced $\rightarrow$ parallel trade allowed
- $\pi = 1$: IPR can be enforced $\rightarrow$ parallel trade forbidden
- Symmetric enforcement across countries
- Trade policy: joint decision on π & τ

ZPC's

Arbitrage Equilibrium

- Northern firm: charge price p at home and price p^* abroad
- If price differential is too large, arbitrage opportunities emerge, then either:
 1. charge constrained price τp^* at home and p^* abroad
 2. charge unconstrained price p at home and **no** export

⇒ Trade-off between price and market size
- In equilibrium, some Northern firms choose not to export their product (→ export zeros)
- All Southern firms export

Equilibrium

Policy: Parallel Trade

Stronger IPR enforcement ($\pi \uparrow$)....

- increases export probability of North
(consistent with empirical findings of Goldberg (2010); Ivus (2010))
- lowers prices in South
- raises (lowers) welfare in South (North)
- North prefers to allow parallel trade, because then, more Northern firms abstain from exporting $\rightarrow$ more varieties produced in North
 $\Rightarrow$ **resource feedback mechanism**: key difference to Roy & Saggi (2012)
- South prefers to forbid parallel trade, because then, more Northern firms exports to South

$\Rightarrow$ **Conflict of interest between North and South**

Policy: Trade Costs

If parallel trade is forbidden, a trade liberalisation ($\tau \downarrow$)....

- increases export probability of North & overall trade volume
- raises welfare in both countries
- Both countries prefer free trade
- Standard result in trade models

⇒ **No conflict of interest between North and South**

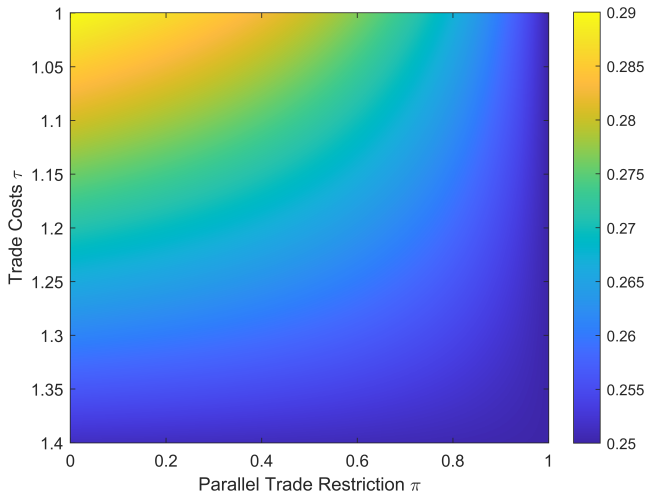
Policy: Trade Costs

If parallel trade is allowed, a trade liberalisation ($\tau \downarrow$)....

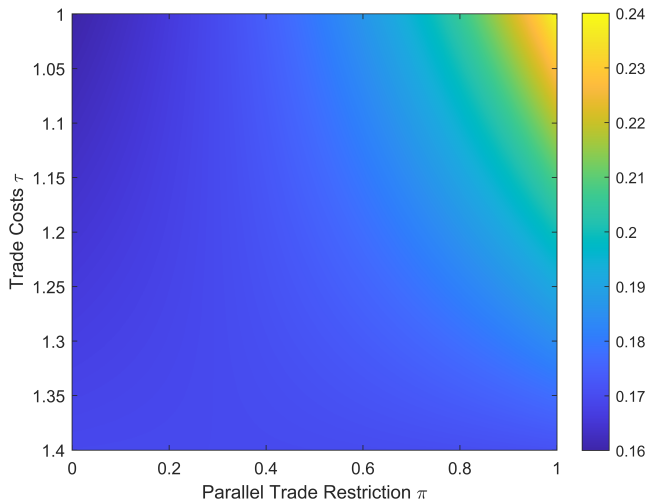
- *decreases* export probability of North & overall trade volume
- shifts ToT in favour of North
- lowers (raises) welfare in South (North)
- North prefers free trade ($\tau = 1$), because then, more Northern firms abstain from exporting
- South prefers high trade costs, because more Northern firms are willing to export

⇒ **Conflict of interest between North and South regarding trade costs**

Trade Policy Choice North



Trade Policy Choice South



Optimal Trade Policy

- Which parallel trade policy is world welfare maximising?

$$\frac{\partial}{\partial \pi} V(\pi) = \frac{\partial}{\partial \pi} \left[\mathcal{P} U(\pi) + \mathcal{P}^* U^*(\pi) \right] > 0$$

- Banning PT ($\pi = 1$) is global welfare maximising (preferred policy of South)
- ⇒ Third-degree price discrimination preferable to global uniform pricing, because otherwise unserved markets
e.g. reminiscent of price discrimination literature (Schmalensee (1981); Varian (1985); Schwartz (1990))
- In this case, both countries also prefer free trade ($\tau = 1$)

Conclusion

We introduce a...

- Trade model with explicit choice of parallel trade policy
- Generate pricing-to-market and demand-induced export zeros
- Reveal conflict of interest between North & South regarding trade policy
- Optimal mix: banning parallel trade & free trade

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Equilibrium Conditions

- Zero Profit Conditions:

$$\text{North, no export: } p\mathcal{P} = W\left(F + \frac{\mathcal{P}}{a}\right)$$

$$\text{North, export: } \pi p\mathcal{P} + (1 - \pi)\tau p^*\mathcal{P} + p^*\mathcal{P}^* = W\left(F + \frac{\mathcal{P} + \tau\mathcal{P}^*}{a}\right)$$

$$\text{South, export: } \pi p\mathcal{P} + (1 - \pi)\tau p^*\mathcal{P} + p^*\mathcal{P}^* = W^*\left(F + \frac{\mathcal{P}^* + \tau\mathcal{P}}{a}\right)$$

back

- Resource Constraints

$$\mathcal{P}L = N_T \left(F + \frac{\mathcal{P} + \tau \mathcal{P}^*}{a} \right) + N_N \left(F + \frac{\mathcal{P}}{a} \right)$$

$$\mathcal{P}^* L^* = N^* \left(F + \frac{\mathcal{P}^* + \tau \mathcal{P}}{a} \right)$$

- Balanced Trade condition:

$$\mathcal{P}^* p^* N_T = [(1 - \pi) \tau p^* + \pi p] \mathcal{P} N^*$$

- Numéraire: $W = 1$
- 7 equations in 7 unknowns: $p, p^*, N_N, N_T, N^*, W, W^*$

Equilibrium

- Prices:

$$p = \left(\frac{aF + \mathcal{P}}{a\mathcal{P}} \right)$$

$$p^* = \frac{(1 - \pi)(aF + \mathcal{P}) + \tau\mathcal{P}^*}{a(\mathcal{P}^* + (1 - \pi)\tau\mathcal{P})}$$

- Terms of Trade (PoV South):

$$\mathbb{E}p/p^* \equiv \xi(\tau, \pi) = \frac{\pi p + (1 - \pi)\tau p^*}{p^*}$$

- Number of varieties:

$$\text{South: } N^* = \frac{a\mathcal{P}^*L^*}{aF + \mathcal{P}^* + \tau\mathcal{P}}$$

$$\text{North, exported: } N_T = \xi(\tau, \pi) \frac{\mathcal{P}}{\mathcal{P}^*} \underbrace{\frac{a\mathcal{P}^*L^*}{aF + \mathcal{P}^* + \tau\mathcal{P}}}_{N^*}$$

$$\text{North, not exp.: } N_N = \underbrace{\left(\frac{a\mathcal{P}}{aF + \mathcal{P}} \right)}_{1/p} \left[L - L^* \underbrace{\left(\frac{aF + \mathcal{P} + \tau\mathcal{P}^*}{aF + \mathcal{P}^* + \tau\mathcal{P}} \right)}_{\omega} \xi(\tau, \pi) \right]$$

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