

The GE Effects of Parallel Imports

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Inequality and trade flows

Linder (1961) *"... the more similar the demand structures of two countries, the more intensive, potentially, is the trade between these two countries."* and *"... the similarity of average income levels could be used as an index of similarity of demand structures."*

- Income distribution as a determinant of trade flows

Hunter and Markusen (1988), Hunter (1991), Francois and Kaplan (1996), Dalgin et al. (2008), Fieler (2010)

Price differences in tradeables

- (Export-)prices differ across countries, firms set higher prices in richer markets
Manova and Zhang (2009), Hummels and Lugovsky (2010), Simonovska (2015)
- Zeros in bilateral trade flows
Helpman, Melitz, and Rubinstein (2006)
- Bigger firms export to poorer markets
Bernard, Jensen and Schott (2007)

Price differences give incentives to parallel imports

- Welfare analysis of parallel trade in partial equilibrium, price heterogeneity vs. serving all markets
Tirole (1988), Malueg and Schwarz (1994)
- Parallel trade, IPR, and price regulation in pharmaceutical industries
Grossman and Lai (2008), Bennatto and Valetti (2012), Roy and Saggi (2012), Ivus et al. (2017), Reisinger et al. (2018)
- Examples: Pharmaceuticals (WHO 2001, Ganslandt and Maskus 2004, Goldberg 2010), cars (Yeung and Mok 2013), consumer electronics (Feng 2013), etc.

Introduction: Bringing these facts together

- New (New) Trade Theory (Krugman, Melitz): Model of “similarity” in GDP: holding GDP constant, no separate impact of per-capita incomes and population size
- Building on Foellmi, Hepenstrick and Zweimüller (2018), we use a setup of *rich* and *poor* countries where consumers have non-homothetic preferences; countries that are more similar in per-capita incomes trade more
- Allows to study parallel imports in a GE context - importance of resource constraint

Related theoretical literature

- “New” Trade Theory: Krugman (1980), Davis (1998)
- Ricardian Trade: Matsuyama (2000, 2018), Falkinger (1990)
- New trade models with non-homothetic preferences: Neary (2007), Fajgelbaum et al. (2009), Fieler (2010), Jaimovich and Merella (2011), Fajgelbaum and Khandelwal (2016), Foellmi, Hopenstrick and Zweimüller (2018) etc.

Introduction: Preview of results

- Countries that are more similar in per-capita incomes trade more. Driven by price-setting behavior of monopolistic producers (endogenous mark-ups that may differ across industries)
- Arbitrage may influence gains from trade and shape poor countries' preferences towards protectionism
- Parallel exports have opposing welfare effects for rich and poor countries - and rich and poor consumers within an economy

The model: endowments

- 2 Countries: Home $(L, \mathcal{P})$ and Foreign $(L^*, \mathcal{P}^*)$
- L endowment with efficiency units of labor, $\mathcal{P}$ population
- Home country is richer: $L > L^*$ and $\mathcal{P} \geq \mathcal{P}^*$

The model: technology and market structure

- Only labor used in production: F ...setup costs , a ...productivity
- Ad-valorem “iceberg” transportation costs $\tau > 1$
- Monopolistically competitive product markets, infinitely many potential products
- Perfectly competitive labor market

Comparison: CES case

- Isoelastic demand functions
- Constant markups in different markets
- Relative price differences given by ad-valorem trade costs τ
- No incentives for parallel imports

The model: non-homothetic preferences

- Goods come in discrete units, consumers are satiated after consuming one unit
 $c_H(j) \in \{0, 1\}$... consumption indicator for goods produced in H
 $c_F(j) \in \{0, 1\}$... similarly, for goods produced in F
- Utility function is assumed to take the form

$$U = \int_{j=0}^{\infty} c_H(j) dj + \int_{j=0}^{\infty} c_F(j) dj$$

The model: consumers' choices

- $\mathcal{L} = \int_{j=0}^{\infty} c_H(j) dj + \int_{j=0}^{\infty} c_F(j) dj - \lambda \left[\int p_H c_H dj + \int p_F c_F dj - WL \right]$
- First-order condition

$$c_H(j) = 1 \text{ if } 1 \geq \lambda p_H(j)$$

$$c_H(j) = 0 \text{ if } 1 < \lambda p_H(j)$$

Similarly, for $c_F(j)$.

- A consumer purchases variety j if the price $p_k(j)$ does not exceed $1/\lambda$, the inverse of her marginal utility of income (i.e., the consumer's *willingness to pay*)

$$\text{purchase if: } p_k(j) \leq \frac{1}{\lambda}, \quad k = H, F$$

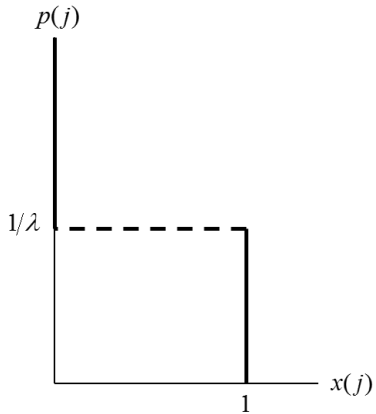


Figure: Demand function

Equilibrium conditions with full trade

- Budget restrictions

$$\begin{aligned}p(N + N^*) &= WL \\ p^*(N + N^*) &= W^*L^*\end{aligned}$$

- Zero profit conditions

$$\begin{aligned}p\mathcal{P} + p^*\mathcal{P}^* &= W \left(F + \frac{\mathcal{P} + \tau\mathcal{P}^*}{a} \right) \\ p\mathcal{P} + p^*\mathcal{P}^* &= W^* \left(F + \frac{\mathcal{P}^* + \tau\mathcal{P}}{a} \right)\end{aligned}$$

- Resource constraints

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

Results: Full trade

- When all home goods $j \in [0, N]$ and foreign goods $j \in [0, N^*]$ are consumed

$$U = U^* = N + N^*$$

Same utility in both countries (choice only along the *extensive* margin, no choice along the *intensive* margin)

- Range of products proportional to efficiency units of labor

$$\frac{\mathcal{P}L}{\mathcal{P}^*L^*} = \frac{N}{N^*}$$

- Higher prices and markups in more productive country

$$\frac{p}{p^*} = \frac{WL}{W^*L^*} \quad \text{and} \quad \frac{p/W}{p^*/W^*} = \frac{L}{L^*}$$

Arbitrage constraints binding I

- Firms will face a threat of parallel imports (arbitrage) when countries are too dissimilar, i.e. L^*/L too small. With large price differentials, there is an incentive for arbitrage
- To prevent parallel imports (exports) to the rich home country, home (foreign) exporters have to obey an upper limit on the price they can set in the home country p_T such that

$$p_T \leq \tau p^*.$$

Arbitrage constraints binding II

- In an equilibrium where international price discrimination is limited, all foreign producers *but not all home producers* sell on both markets.
- Some home producers sell only on the home market at high prices (exploiting the high willingness to pay from the rich home country consumers). Since the latter firms do not export, they are not subject to the threat of parallel imports and hence are unrestricted in their price setting behavior.

Firm structure with arbitrage

- Non-exporters sell exclusively on the rich home market (they exploit the higher willingness to pay of the consumers in the rich country)
- Poor country agents cannot afford all goods
- N_T : Traded home country spectrum, N_N : Non traded home country spectrum
- Budget restrictions

$$\begin{aligned}p_T (N^* + N_T) + p_N N_N &= WL \\ p^* (N^* + N_T) &= W^* L^*\end{aligned}$$

Equilibrium conditions with arbitrage

- Zero profit conditions

$$p^* \mathcal{P}^* + p_T \mathcal{P} = W \left(F + \frac{1 + \tau}{a} \right)$$

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$$p_N \mathcal{P} = W \left(F + \frac{1}{a} \right)$$

- Resource constraints

$$\mathcal{P} L = N_T \left(F + \frac{1 + \tau}{a} \right) + N_N \left(F + \frac{1}{a} \right)$$

$$\mathcal{P}^* L^* = N^* \left(F + \frac{1 + \tau}{a} \right)$$

- Balance of payment condition

$$\mathcal{P} N_T = \mathcal{P}^* \tau N^*$$

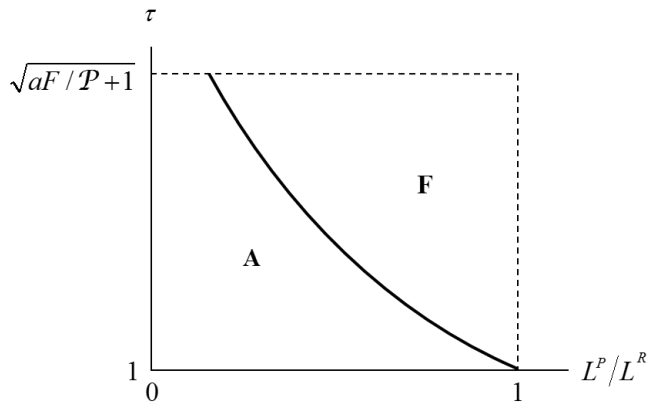


Figure: Arbitrage vs. full trade equilibria

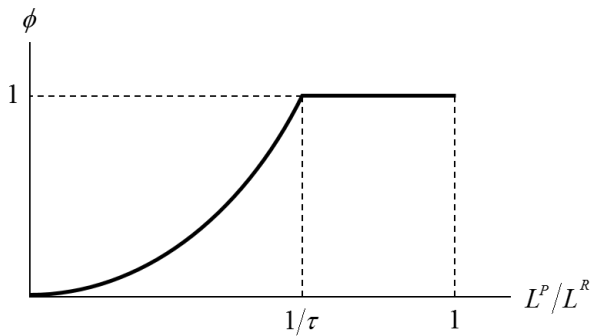


Figure: Trade intensity as a function of relative per-capita endowments

Welfare and the gains from trade

- In a full trade equilibrium, a reduction of τ increases utility of both countries
 - In a arbitrage equilibrium, a reduction of τ increases utility of the rich country and decreases utility in the poor country
- ⇒ The rich country benefits from cheaper traded goods
- ⇒ The poor country is hurt by deterioration of terms of trade (higher export prices when parallel trade was forbidden)

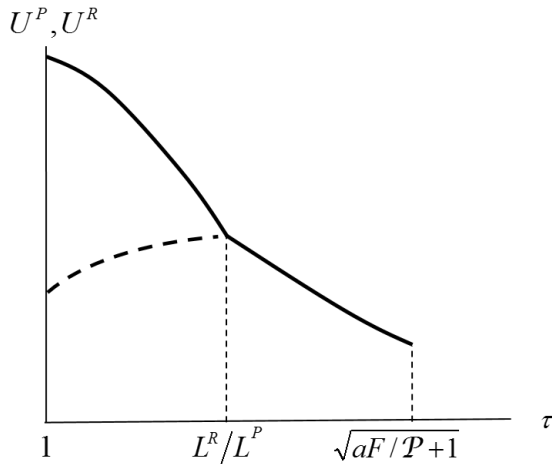


Figure: Welfare and trade costs

Threat of parallel trade and (inter)national exhaustion I

- Until now we implicitly assumed international exhaustion (as valid within EU): original “control of sales” rights are lost as soon as product is sold.
- Extension: Producer only knows probability π that she faces parallel trade

$$\begin{aligned}\mathbb{E} [\text{Revenues}] &= F + \frac{(1 + \tau)\mathcal{P}}{a} \quad \text{and} \quad p_N \mathcal{P} = F + \frac{\mathcal{P}}{a} \\ \mathbb{E} [\text{Revenues}] &\equiv \pi (p^* \mathcal{P}^* + p_N \mathcal{P}) + (1 - \pi) (p^* \mathcal{P}^* + \tau p^* \mathcal{P})\end{aligned}$$

Threat of parallel trade and (inter)national exhaustion II

- Higher probability of parallel trade has asymmetric welfare effects on poor and rich countries
- Stricter enforcement of parallel import restrictions, a higher π , is associated with lower prices p for internationally traded products in the poor country

$$p = \frac{1}{1 + \tau - \pi\tau} \left(\frac{F}{\mathcal{P}} + \frac{1 + \tau}{a} - \pi \left(\frac{F}{\mathcal{P}} + \frac{1}{a} \right) \right).$$

Inequality within countries I

- Consider the case of two similar countries with two groups, poor and rich, within countries. Labor endowment of poor and rich L_P and L_R , respectively
- With low inequality
 - some firms sell to all consumers in both countries, price p_P
 - some firms sell to all consumers at home but only to the rich in the exporting market, price p_R
- Welfare levels

$$U_P = \frac{L_P}{p_P}$$
$$U_R = \frac{L_P}{p_P} + \frac{L_R - L_P}{p_R}$$

Inequality within countries II

- With binding parallel imports, firms' price discriminatory power is limited. Rise of exclusive firms, that sell to the rich only in both markets. With higher average costs, p_R is higher and U_R falls
- Rich consumers favor more strict enforcement of parallel import constraints (e.g. national exhaustion)
- The social planner would always choose a positive measure of firms selling to all at home and to a subset of consumers abroad

Is parallel trade quantitatively important?

- Difficult to observe directly
- Use a framework that allows for price differences across countries, with preferences allowing for an intensive margin, e.g. Simonovska (2015)
- Implied price differences between countries exceed estimated trade costs for more than 20% of exporter-destination pairs or about 45% of trade volume

Conclusions

- Asymmetric welfare gains in trade openings
- Poor countries may lose from lower trade barriers or increased parallel exports
- Enforcement of parallel export constraints exhibits opposing welfare effects for rich and poor countries - and rich and poor consumers within an economy