ECO 745: Theory of International Economics

Jack Rossbach

Fall 2015 - Lecture 19

Additional Topics Related to International Trade

Briefly mention some topics we won't have time to cover, but should be aware of

- Location Models
- Trade Agreements and Political Economy

Location Models

Basic example is Hotelling location model

- Unit interval of consumers, $z \in [0,1]$
- Firms located on interval (fixed or can allow relocation)
- Transportation cost t, so effective price for consumers purchasing from firm j is $p_j + tD(z,j)$

- Consumers buy from cheapest source

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Standard applications of location models

- Fix firm location: How should they price their goods?
- Allow firms to move: Where will they locate?

Vogel (2008)

Builds on Salop's Circle Model

- Circle with unit circumference, consumers uniform distributed around circumference, $z \in [0,1)$
- $i, j = 1, \ldots, N$ firms located on circle.
- Consumers have utility from purchasing one unit of output from firm i equal to

$$u(z,i) = v - p_i - tD(z,i)$$

- Transportation cost for consumers equal to $tD(z,i)$
- Consumers have reservation price v
- Consumers buy from only one firm, as long as less than reservation price. Buy from i if

$$i \in \arg\min_{j \in N} p_j + tD(z,j) \qquad \text{and} \qquad p_i + tD(z,i) \leq v$$

Spatial Competition

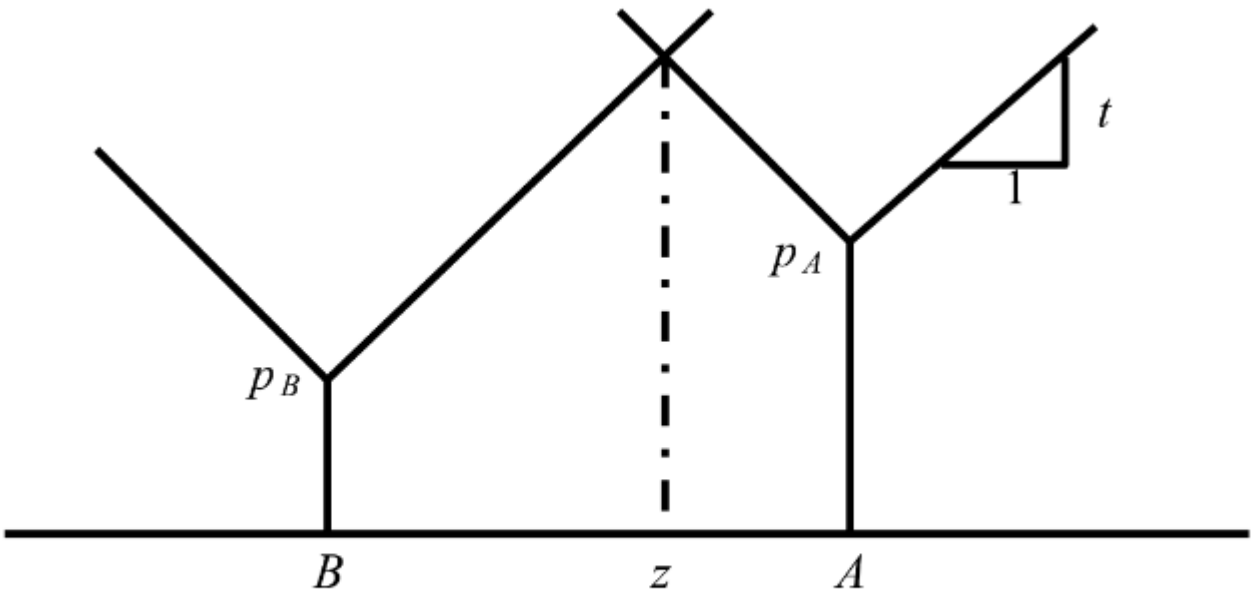

FIG. 1.—Location-adjusted prices and the indifferent consumer

Vogel (2008)

Production and Profits

- Each firm has constant marginal cost of production: k_i
- Firm also has transportation cost for supplying a consumer at z given by $2\tau D(z,i)$
  - In standard location models pre-Vogel, typically $\tau = 0$
  - $\tau > 0$ (can be small) required for uniqueness
- Profits for firm i selling one unit to consumer at location z is

$$\pi(z,i) = p_i - k_i - 2\tau D(z,i)$$

The Game

$N \geq 2$ firms play a two-stage game of complete information

- **Stage 1**: Firms simultaneously choose locations on the circumference of the circle, $z_i \in [0,1)$
- **Stage 2:** Firms observe locations, and simultaneously choose prices $p_i \in [0, \infty)$

The Game

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A **Pure Strategy** is a choice of location and a mapping from locations into prices

- **Mixed Strategy** for firm i specifies probability distribution over locations and a probability distribution over prices as a function of locations
- SPNE is strategies for each firm is optimal given strategies of other firms in all subgames

No Pure Strategy SPNE

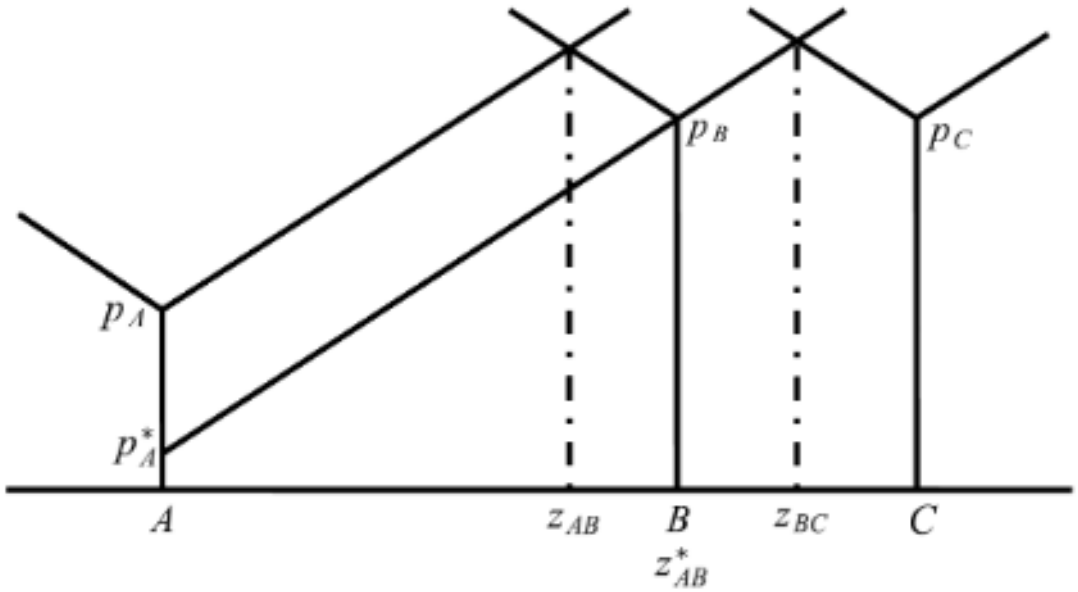


FIG. 2.—Market shares are discontinuous in prices

Problem is undercutting.
Firm A will want to undercut B to take all of B's market share.
This makes profits discontinuous and opens up subgames with no Pure Strategy Eqm

Vogel (2008)

The Problem

Prices given locations:

- No Pure Strategy SPNE for game or stage 2
- There is a Mixed Strategy SPNE for each stage 2

Problem: How to find locations?

- Standard Salop models simply assumed firms would be equally spaced somehow
- Don’t want to simply impose locations, want to find SPNE
- Prohibitively difficult to solve for this Mixed Strategy SPNE for every possible set of locations and using backwards induction with N firms

The Trick

The difficulty in finding SPNE is caused by desire to undercut

Vogel has a very clever solution

- Vogel defines an auxiliary game with no undercutting
- This auxiliary game permits Pure Strategy SPNE

Connects auxiliary game to real game

- Shows if firms follow SPNE in real game, profits are equal in auxiliary and real games
- Show that profit in auxiliary game is upper bound for profit in real game
- ⇒ SPNE in auxiliary game is SPNE in real game

The Auxiliary Game

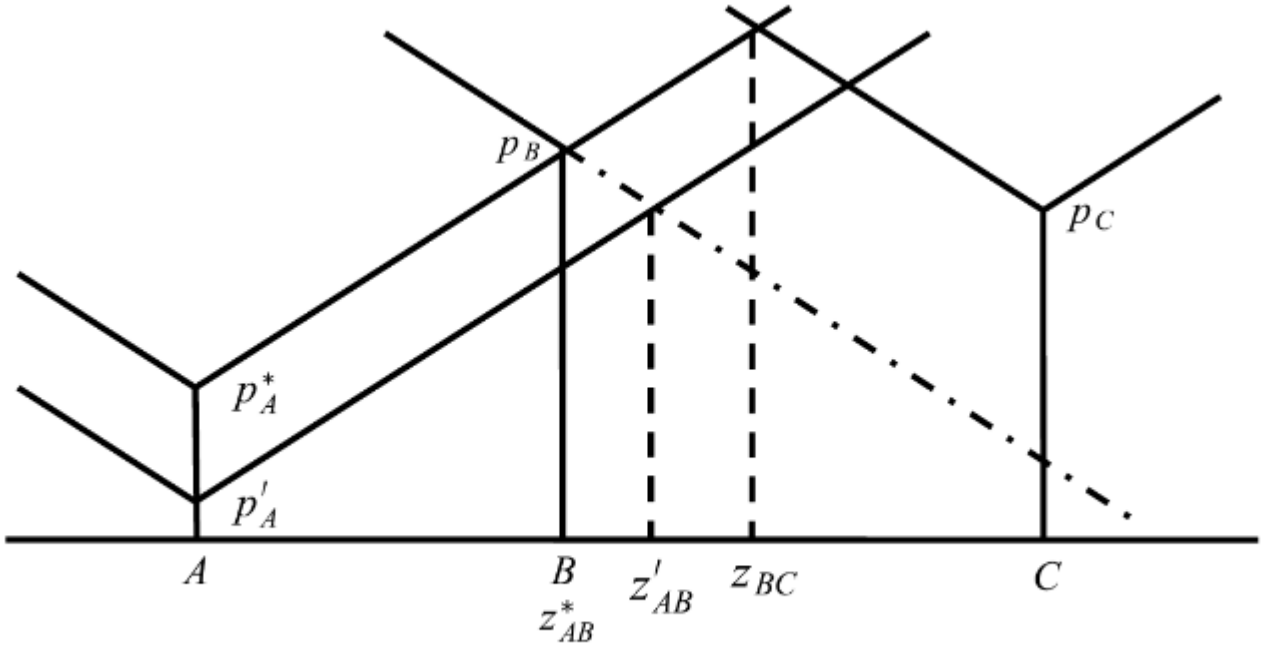


FIG. 3.—Market shares in the auxiliary and real games

No undercutting.
If Firm A charges price p_A' only gets consumers in $[A, z_{AB}')$ **NOT** $[A, \boldsymbol{z_{BC}})$
Firm B keeps consumers in $[z_{AB}', z_{BC})$ regardless of A's price

Vogel (2008)

Conclusion

Vogel develops framework where firms differentiate themselves horizontally

- Solves longstanding problem surrounding choice of location in circle model

Interesting results after characterizing equilibrium

- Firms price, market share, and location are only affected by competitors through average marginal cost in market
    - Not important who a firms' nearest neighbor is
- Distance between competitors products is increasing in their productivity
    - More productive firms more isolated

Topic 2: Trade Agreements and Political Economy

Large literature on political economy of trade protectionism and agreements

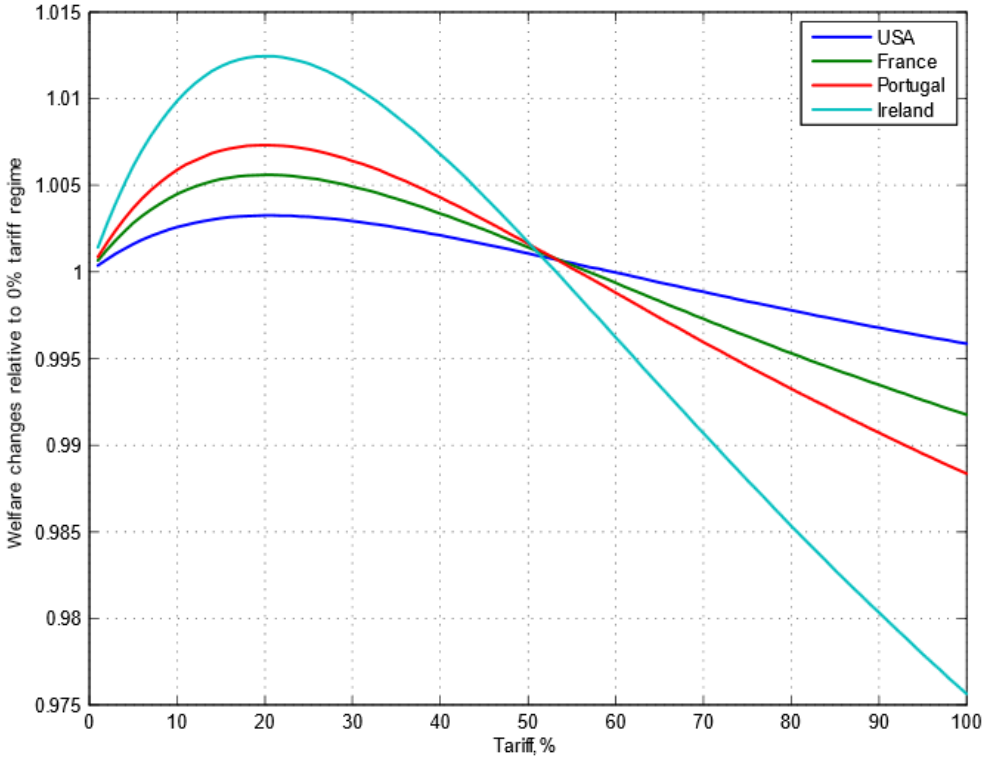
- Why do countries choose protectionism?
- Why do trade policies very across countries?
- Why do organizations like WTO exist?
- How should FTAs be designed?

Unilateral Tariffs

Saw in basic Ricardian framework that optimal unilateral tariffs are non-zero

- Problem is trade wars and prisoner's dilemma

Welfare Effects of Unilateral Tariffs



Costinot and Rodriguez-Clare (2013)

Unilateral Tariffs

Saw in basic Ricardian framework that optimal unilateral tariffs are non-zero

- Problem is trade wars and prisoner's dilemma
- Both countries worse off if everybody imposes tariffs
- How much worse off depends on framework
    - Larger welfare losses with monopolistic competition and with trade in intermediates

A Theory of the GATT/WTO

Bagwell and Staiger (1999,2003) discuss why the GATT/WTO exists

- What problem does it solve?
- Focus on two features of the GATT/WTO: Reciprocity and Nondistrimination

What Problem Does the WTO Solve

In a standard small open economy framework, unilateral tariffs are free trade

- No need for the WTO, will have free trade due to unilateral optimality (maximizes income)

Provides hints as to why FTAs might exist

- Countries may not maximize national income, e.g. political motivations
    - Grossman and Helpman (1994) briefly mentioned in lecture 4 as example of lobbying
- Countries may be large

non-Optimality of Unilateral Tariffs for Large Economies

Bagwell and Staiger (1999) show that Unilateral Nash Equilibrium tariffs are not Pareto Optimal

- There is a terms-of-trade externality, which is **only** reason for non-optimality
    - When an import tariff is imposed, part of cost is shifted to foreign exporters
    - For wide class of gov. objective functions, ToT externality only source of inefficiency
- Purpose of trade agreements are therefore to address these ToT effects

Key Features of WTO

Set up a game where countries negotiate over tariffs and formalize features of WTO

Reciprocity: Mutual changes in trade policy such that world price is unchanged

- Changes in value of each country's imports equals changes in value of each country's exports
- Reciprocity eliminates inefficiency caused by world price effects
- Key feature is that it separates outcome of negotiations from bargaining power of negotiators

Non-discrimination: In a multicountry framework, tariffs can be discriminatory and inefficient even under bilateral reciprocity, therefore need non-discrimination so tariffs are applied uniformly on a given product across all trading partners

- Preferential FTAs circumvent non-discrimination and undermine the WTO/GATT