

Esteban Rossi-Hansberg: A Spatial Theory of Trade

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Income and city size

Pre-introduction

● income and city size

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Introduction

Model

Insights from numerical
examples

- Doubling the population of a city increases "productivity" by 3 to 8 percent (Puga 2010)
- Could this be because income distribution is skewed?
Example:
 - 100 people, one earning an income of \$1,000,000 and the rest earning an income of \$0
 - 2 cities: one of size 99 and one of size 1.
 - With prob. 0.99, the average income in the large city is $\frac{\$1,000,000}{99}$ and the average income in the smaller city is \$0.

Income and city size: numbers

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- 0.6 of a percent of the population earn \$1,000,000, and the rest earn the median income of \$40,000
 - Because the top 1% of the data is cut off, cities are a random sample of the population. The "skewness" argument will not work.
- Add an assumption that people divide into groups (industries? communities?) with similar incomes. The size of such a group is x .

Income and city size: numbers

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- Given groups of size x , the expected percent increase in average income given a doubling of the city size is:
 - $x = 1,000$: about %0.3 increase
 - $x = 10,000$: about %1.5 increase
 - $x = 100,000$: about %2 increase
- These are potentially non-trivial in explaining the 3-8 percent.

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Questions

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- Border effects
- "More generally, our theory can address questions on how trade barriers, transport costs, and technology affect the distribution of economic activity in space, and the corresponding trade flows."

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- Setup
- Equilibrium
- Border

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Model

Setup

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- Continuum of locations on a line
- One final good, one intermediate good
- Production externality in both sectors that decays with distance
- Free labor mobility across locations and sectors
- Costly transportation of both intermediate and final goods
- Competitive markets, profits paid as land rents

Properties of equilibrium

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- **Equilibrium**
- Border

Insights from numerical
examples

- There is a function $p_m(r)$ which is the relative price (of IG) that equalizes the value of land at location r in both sectors.
 - If $p(r) \neq p_m(r)$ then location r is specialized.
- An equilibrium exists

Border effects

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- Intuition: if there is a small barrier to international trade, agents can easily substitute imports with domestic production because of "cross border" technological spillovers
- This explanation is appealing when (in the absence of everything else) we think about why there is little trade in oranges between Israel and Gaza
 - People in Gaza can replicate the methods of growing oranges in this region so there is not a huge pressure towards trade.

Border effects

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- This explanation is appealing when (in the absence of everything else) we think about why there is little trade in oranges between Israel and Gaza
 - People in Gaza can replicate the methods of growing oranges in this region so there is not a huge pressure towards trade.
- This is less compelling as an explanation for difference in supermarket wholesale prices (Gopinath et. al)
 - Many products are imported (technological spillovers are small)

Border effects

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Insights from numerical
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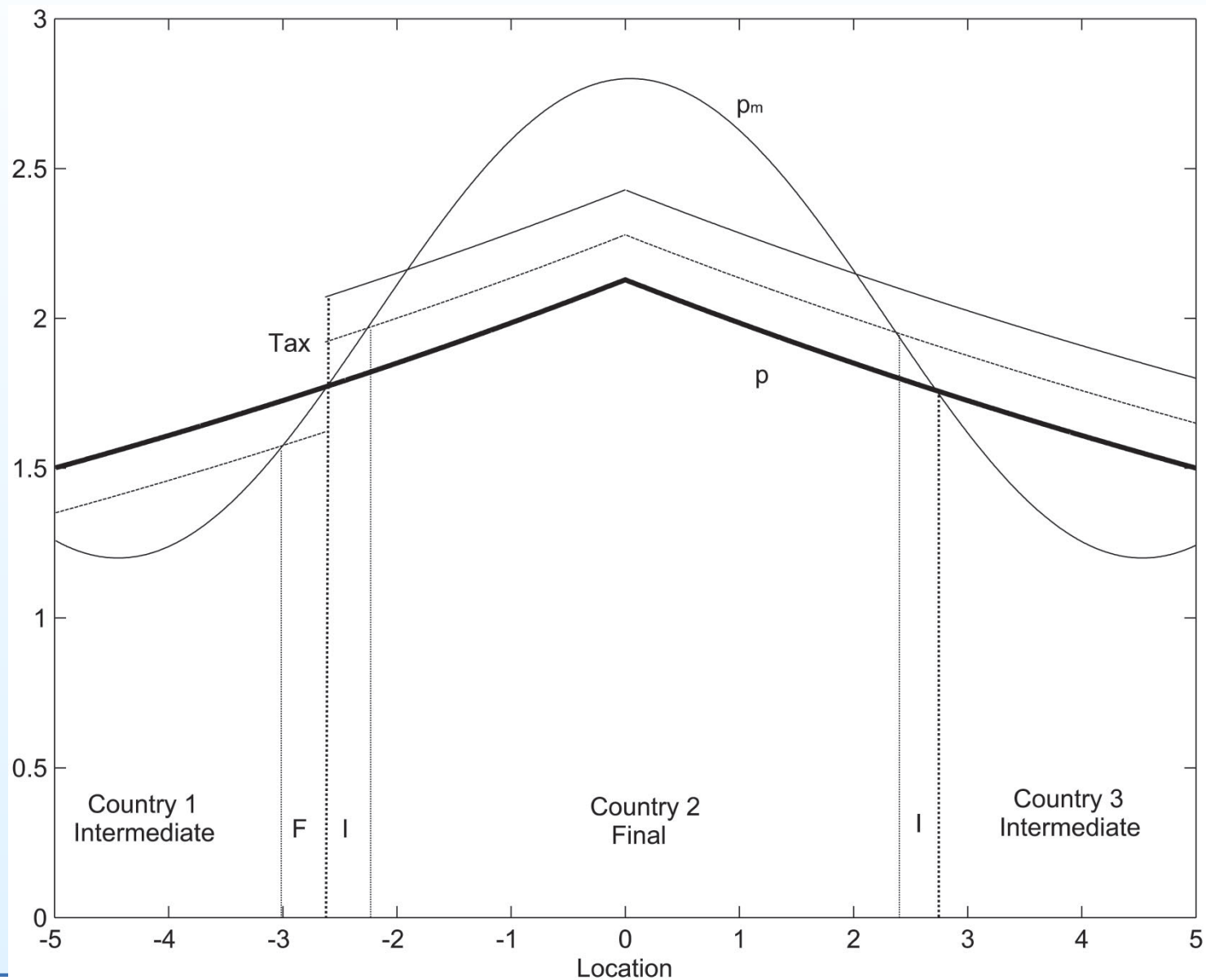


FIGURE 1. THE EFFECT OF AN IMPORT TAX WITH FIXED PRODUCTIVITIES

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- Algorithm
- Transport costs
- Externality
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- Labor shares

Insights from numerical examples

Algorithm for computing an equilibrium

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- Given functions mapping location to productivity in each sector, compute equilibrium allocations
- Given production allocations, re-compute productivities based on production externalities, and iterate

Transport costs

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- Increasing transport costs reduces specialization
 - If it is expensive to transport intermediate goods it is more profitable to produce them near locations of final good production
 - If it is more expensive to transport final goods then hiring labor for the production of intermediate goods is more expensive

Externality parameters

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- If the elasticity of output with respect to spillovers is higher in a certain industry, that industry will become more concentrated (and hence also more productive)
 - Industries in their early stages are concentrated
- If spillovers decline less fast with distance, the industry becomes less concentrated
 - Expansion of global manufacturing as a result of improvement in communication technologies in the 20th century

Labor shares

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- Hold wages fixed (and allow population to adjust)
 - Decreasing labor shares makes industry less concentrated (more "land intensive").
 - Mechanism: rents to land owners increase, so points of indifference turn into specialized points.
 - Employment declines.

Labor shares

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- Hold population fixed (and allow wages to adjust)
 - Decreasing labor shares makes industry more concentrated (less "land intensive").
 - Mechanism: capital share increases so labor becomes less expensive
- Implication: "low human capital" industries (fixed wage) should be more concentrated the higher their labor shares, and "high human capital" industries (fixed population) should be less concentrated the larger their labor shares