Sources of Industry Agglomeration in Developing Countries
Controversial Issues in the Economic Geography Literature

Pedro Herrera Catalán
PhD. Student

March, 2017
Objective

Elaborate a critical review controversial issues of the Economic Geography literature concerning the sources and characterization of industry agglomeration in developing countries.
Controversial Issue 01

The Role of the Agricultural Transport Costs
NEG Models

Sector-A (agriculture)
- Walrasian (CRS & Perf. Comp.)
- Variable Costs = a_A units of L per unit of A
- A is the numeraire (p_A=1)

- No trade costs
- Homogeneous agriculture

Sector-M (Manufactures)
- Dixit-Stiglitz Model monopolistic comp.
- Increasing Returns to Scale:
- Fixed + Variable costs

L^M moves according to real wage gaps:
\[ w - w^* \equiv \frac{w}{P} - \frac{w^*}{P^*} \]

Iceberg transport costs and "the index of freeness of trade varies between 0>Z>1"

Z is the freeness of trade:
(if T=1, Z=0, trade is costless; if T=0; Z=1 trade is impossible)

Migration
NEG: Organisation of the Overall Space

Labour supply adjusts

Wage gap

Industrial Core  Workers

Agricultural periphery  Workers

Population

NEG: Organisation of the Overall Space
But, in The Real World…

Agricultural labour force as share of total (%)

- Transforming economies, 57%
- Agriculture based economies, 65%
- Urbanized economies, 18%

Agricultural GDP as share of total (%)

- Agriculture based economies: 29%
- Transforming economies: 13%
- Urbanized economies: 6%

### Agricultural Transport Costs cause Agglomeration (A) or Dispersion (D)?

<table>
<thead>
<tr>
<th>Reference</th>
<th>Result</th>
</tr>
</thead>
<tbody>
<tr>
<td>Fujita et al. (1999)</td>
<td>D</td>
</tr>
<tr>
<td>Davis (1998)</td>
<td>D</td>
</tr>
<tr>
<td>Yu (2005)</td>
<td>D / A</td>
</tr>
<tr>
<td>Zeng and Kikuchiz (2005)</td>
<td>A</td>
</tr>
<tr>
<td>Crozet and Trionfetti (2008)</td>
<td>A</td>
</tr>
<tr>
<td>Picard and Zeng (2005)</td>
<td>D</td>
</tr>
<tr>
<td>Herrera (2014)</td>
<td>D</td>
</tr>
</tbody>
</table>
Illustration: Industry Agglomeration and ATC

LOCALISED INDUSTRY: Preparation and Spinning of Textile Fibres; Weaving (SIC 1711)

Based on Herrera (2014)
Controversial Issue 02
The Role of the First and Second Nature
Production orientated – classic economist’s view:

*Understand where firms locate*
- Scale economies in trade (pre-industrialization)
- Scale economies in manufacturing (industrialized)
- External returns - agglomeration economies (post-industrialized)

Increase in importance of second relative to first nature geography in *developed countries.*
Most Economic Geography models habitually REMOVE the “first-nature forces” - coasts, mountain ranges, natural endowments - so as to capture the essence of the second nature geography

(Tan and Zeng, 2014; Picard and Zeng, 2010)

The real world is a mixture of both economic geographies
(Chasco et al. 2012; Ellison and Glaeser, 1997; Duranton and Overman, 2005)
Are 2nd Nature Forces Higher than 1st Nature Forces?

Results for developing countries:

<table>
<thead>
<tr>
<th>Study</th>
<th>Result</th>
</tr>
</thead>
<tbody>
<tr>
<td>Ricci (1999): 1&lt;sup&gt;st&lt;/sup&gt; &gt; 2nd</td>
<td>D</td>
</tr>
<tr>
<td>Forslid and Wooton (2003): 1&lt;sup&gt;st&lt;/sup&gt; &gt; 2nd</td>
<td>D</td>
</tr>
<tr>
<td>Handley (2012): 1&lt;sup&gt;st&lt;/sup&gt; &gt; 2nd</td>
<td>D</td>
</tr>
<tr>
<td>Epifani (2005): 2nd &gt; 1&lt;sup&gt;st&lt;/sup&gt;</td>
<td>A</td>
</tr>
<tr>
<td>Amiti (2005): 2nd &gt; 1&lt;sup&gt;st&lt;/sup&gt;</td>
<td>A</td>
</tr>
</tbody>
</table>
Controversial Issue 03
Agglomeration or Dispersion?

Only a few agglomeration studies have been developed in developing countries. (see Henderson et. al., 2001; Duranton, 2008).

For example, in Korea, Mexico and Brazil, it have been found patterns of geographic dispersion of economic activities (Hanson, 1996; Henderson et al., 2002).
None of the studies published have addressed a wide range of theories of industry agglomeration in developing countries.

Controversial issues concerning industry agglomeration in developing countries have not been considered into the NEG models.

As a Result: Evidence for the joint impact of both the ATC and the 1st and 2nd nature forces over industry agglomeration in developing countries remains inconclusive.
Illustration: Industry Agglomeration in Peru...(I)

Duranton-Overman Index

Step 01: Calculation of Kernel Density Function (K-densities)
Step 02: Simulating Counterfactuals
Step 03: Constructing Global Confidence Bands

Global localisation:

\[
\Gamma(d) \equiv \max(K_A(d) - \bar{K}_A(d), 0)
\]

Global dispersion:

\[
\Psi(d) \equiv \begin{cases} 
\max(K_A(d) - \bar{K}_A(d), 0) & \text{if } \sum_{d=0}^{180} \Gamma(d) = 0 \\
0 & \text{otherwise}
\end{cases}
\]
Illustration: Industry Agglomeration in Peru...(II)

(a) Global localisation
(b) Global dispersion

Type I
Type II
Type III

Based on Herrera (2014)
Controversial Issue 04
Spatial efficiency-equity tradeoffs
Aproximadamente el 50% de lo que se produce en el mundo cabe en el 1.5% de la superficie del planeta.

En 55% de las empresas manufactureras del país se encuentran en Lima.
Less Prosperous Regions in Peru

Peru: Incidence of Monetary Poverty by groups of regions

Source: INEI, 2013
Is Increasing Economic Concentration Viewed as a Beacon of Progress?

- Policymakers usually try to stimulate economic growth in areas not favoured by the market. BUT

  ✓ Are these policies fighting market forces of industrial agglomeration? (spatial efficiency)

  OR

  ✓ Are they adding value to the national economy by balancing economic activity across the territory? (spatial equity)

Controversy: spatial efficiency - equity tradeoffs
In developing countries:
(i) information on constraints to growth are limited
(ii) policymakers lack empirical evidence to inform their decisions

This controversy is aggravated by the lack of a comprehensive framework that allows a better understanding of industrial agglomeration of developing countries
Identifying High Return Areas

Location Patterns of Manufacturing Firms in Lima

Thank you!!!

Comments and suggestions are welcome!

pedro.herrera@predoc.uam.es
CHAPTER 01
Characterisation and Sources of Agglomeration

Sources of Industry Agglomeration:
- Agricultural transport costs
- First-nature advantages
- Second-nature forces
- First order conditions (centripetal forces)
- Second order conditions (centrifugal forces)

CHAPTER 02
Estimating Transport Costs for Agricultural Goods

Iceberg Transport Technology: Estimation of Agricultural transport costs (McCann, 2005; Samuelson, 1952, 1954)

Methods:
- OLS
- Heckman two-step estimation

CHAPTER 03
Measuring Industrial Agglomeration

Non-parametric tools: Distance-based tests of industry localisation (Duranton and Overman, 2005)

Output:
- Localisation Economies
- Urbanisation Economies

CHAPTER 04
Determinants of Industrial Agglomeration

Spatial regression analysis: Estimation of profit functions (Chasco et. al. 2012; Roos, 2005); McFadden, 1974)

Endogenous variable:
- Expected profit functions

Exogenous variable:
- Agricultural transport costs
- First-nature advantages
- Second-nature forces
- Centripetal forces
- Centrifugal forces

CHAPTER 05
Mapping Tool for Prioritization of Industrial Policies

Methods: Categorical methods and multivariate data analysis (Jobson, 1992; Hair, et at., 2009)

Output: GIS-based interactive web decision support system for policymakers