Analysis of Tourism Demand: A Geographical Perspective

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Outline

- Introduction
- Economic Model of Tourism Demand
- Spatial Interaction Models
- The Application of SIM in Tourism Demand Analysis
- Methodology
- Results
- Conclusion
Introduction

- Tourism demand analysis is crucial because of its great contribution to the understanding of tourists’ consumption, and making marketing strategies for regional tourism development (Song & Witt, 2000).
- Tourism demand models can be divided into two main categories: those in economics (econometric models) and those in geography (spatial interaction models, SIM).
- Unlike economic models, spatial interaction models aim to explain tourism flows from the spatial perspective. In geography, tourism flows are regarded as an interaction between destinations and origins (Smith, 1983).
Introduction

• Although some SIMs have been introduced to model tourism demand, most of them are specified as unconstrained model without the consideration of spatial configuration of origins and destinations.
• This paper aims to review the trend of application of SIMs in tourism demand, and compare the differences of economic models and spatial interaction models in analyzing tourism demand.
• In the empirical study, we will conduct constrained SIMs to estimate tourism demand to six North-eastern Asian destinations, and the spatial structure effects are included.
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Economic Model of Tourism Demand

\[ Q_{it} = AP_t^{\beta_1} Y_{it}^{\beta_2} P_{st}^{\beta_3} e_{it} \]

- Determinants that influence demand include the own price of the good, the price of a substitute good and consumers' income (Song, Wong, & Chon, 2003).
- One of the greatest advantages of demand analysis is that demand elasticities can be calculated based on the estimation results.
- Over the last decade, there has been a surge in the application of modern econometric approaches to model tourism demand (Song & Li, 2008).
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Spatial Interaction Models

- **Distance decay analysis**
  - As the distance increases, travelling costs increase and knowledge about the destination is reduced.

Distance decay functions

Spatial Interaction Models

- Two separate tourist areas will attract trade from an intermediate (tourist generating) point *in proportion* to the size (attractiveness) of the centres and in *inverse proportion* to the distances (Ryan, 2003, p. 137).

\[ T_{ij} = P_i A_j f(D_{ij}) \]

\[ f(D_{ij}) = D_{ij}^{-\gamma} \exp(-\alpha D_{ij}^\beta) \]
Spatial Interaction Models

• Spatial structure effects play important roles in explaining spatial interaction.
• The spatial structure is defined as the spatial configuration of origins with respect to relevant destinations and opportunities and the spatial configuration of the destinations and opportunities with respect to other alternative destinations and opportunities (Kim, 1988).
• If the spatial structure effects are neglected in the SIM, the estimation results tend to be biased (Fotheringham, 1983; Fotheringham, Nakaya, Yano, Openshaw, & Ishikawa, 2001).
Spatial Interaction Models

• Competition effects (CD) reflect the competition that each destination faces from all other destinations. If CD is positive, the agglomeration effects are significant, if it is negative, the competition effect is present.

\[ CD_j = \sum_{m=1}^{n} \frac{A_m}{D_{mj}} \]

• Intervention effects (IO) reflect the fact that opportunities located between the origin and destination exerts absorbing effects on the original spatial interaction (Guldmann, 1999).

\[ IO_i = \sum_{m=1}^{n} \frac{A_m}{D_{im}} \]
Spatial Interaction Models

• The weakness of unconstrained SIM
  – The sum of predicted flows from all potential origins may exceed
    the actual value of total flows to a particular destination.
  – The spatial configuration of destinations and origins may
    contribute to the misspecification of the SIM.

• The basic destination constrained SIM can be given as:

\[
T_{ij} = B_j D_j f(D_{ij}) \quad \quad B_j = \left[ \sum_{i=1}^{r} f(D_{ij}) \right]^{-1}
\]

<table>
<thead>
<tr>
<th>Quantity</th>
<th>Large</th>
<th>Small</th>
</tr>
</thead>
<tbody>
<tr>
<td>Quality</td>
<td>High</td>
<td>origin-constrained /destination-constrained</td>
</tr>
<tr>
<td></td>
<td>Low</td>
<td>unconstrained</td>
</tr>
</tbody>
</table>
Application of SIM

• Some general tendencies of SIM on tourism demand:
  – In early studies, the cross-section regression with constraints was frequently adopted to estimate the gravity model (Bell, 1977; Durden & Silberman, 1975; Malamud, 1973). However, in studies after 2000, some researchers utilized panel data models for estimation, and failed to consider the constraints in the model (Gil-Pareja, Llorca-Vivero, & Martínez-Serrano, 2007; Khadaroo & Seetanah, forthcoming).
  – More economic variables have been introduced to the gravity model, such as the price of tourism in the destination (Gil-Pareja, Llorca-Vivero, & Martínez-Serrano, 2007; Khadaroo & Seetanah, 2008).
  – In early years, SIM was frequently utilized for forecasting and prediction. However, along with the development of modern econometrics and time series methods, SIMs fell into disuse in tourism forecasting (McKercher, Chan, & Lan, 2008).
Application of SIM

• Issues on SIM’s application:
  – Distance effects
  – Spatial structure effects
  – Estimation
  – Gravity-type variables
  – Comparison to Economic Model
Application of SIM

• Distance effects
  – Baxter and Ewing (1986) argued that the original specification of distance deterrence effect is inappropriate because it is a continuous function, and in tourist travel, the distance may be in discontinuities or non-monotonicities.

\[ D_{ij} = D_{ik} + \delta D_{kj} \]

  – In tourism demand, the distance decay effects show high heterogeneity (McKercher, Chan, & Lan, 2008). Smith (1984) found that two categories of factors influencing the distance decay effect in SIM.
Application of SIM

• Spatial structure effects
  – The competition destination effects are most frequently utilized.
  – For intervening opportunities, some dummy variables for alternative destinations are introduced to measure IO.
  – The supply-generated participation effect refers to the phenomenon that the increase in the number, attractiveness, or accessibility of destinations tends to lead to some increase in the volume of tourism flows generated by particular origins (Ewing, 1980)
Application of SIM

• Estimation
  – McAllister and Klett (1976) argued that the log-linear estimation may lead to serious bias and the non-linear estimation procedure is more reliable and robust.

• Gravity-type variables
  – They reflect the sum of potential attractiveness, opportunities, and emissiveness relative to geographical distance in a particular region. Such as the supply availability of tourism opportunities (Miller, 1982), and the marketing potential (Haninka & White, 1999; Haninka & Stuttsb, 2002)
## Application of SIM

- **Comparison to economic models**

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<th>SIM</th>
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<td>Spatial interaction theory</td>
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<td>International</td>
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<td>Tourist arrivals</td>
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<td>Log-linear, Poisson</td>
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<td>OLS, MLE</td>
<td>OLS, MLE, NLS</td>
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<td>$R^2$, LR test, F</td>
<td>RNWP, SRMSE</td>
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<td>Time-series, Panel data</td>
<td>Cross-section, Panel data</td>
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<td>Single destination and Multi origin</td>
<td>Multi destination and Multi origin</td>
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<td><strong>Coefficients for implications</strong></td>
<td>Price elasticity, substitute elasticity, income elasticity</td>
<td>Distance decay parameter, CD, IO</td>
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<td><strong>Potential bias in estimation</strong></td>
<td>Time dependence, heteroestasticity</td>
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Methodology

• The unconstrained spatial interaction model

\[ T_{ij} = \text{INCOME}_i \cdot \text{POP}_i \cdot \text{IO}_i \cdot \text{POP}_j \cdot \text{CD}_j \cdot P_{ij} \cdot f(D_{ij}) \]

• The destination constrained spatial interaction model is specified as:

\[ T_{ij} = B_j \cdot \text{INCOME}_i \cdot \text{POP}_i \cdot \text{IO}_i \cdot \text{POP}_j \cdot P_{ij} \cdot f(D_{ij}) \]

\[ B_j = \left[ \sum_{i=1}^{r} \text{INCOME}_i \cdot \text{POP}_i \cdot \text{IO}_i \cdot \text{POP}_j \cdot P_{ij} \cdot f(D_{ij}) \right]^{-1} \]
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## Results

### Table  Estimation Result of Empirical Models

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<th>Model 1</th>
<th>Model 2</th>
<th>Model 3</th>
<th>Model 4</th>
<th>Model 5</th>
</tr>
</thead>
<tbody>
<tr>
<td>lnINCOMEi</td>
<td>0.851***</td>
<td>0.802***</td>
<td>0.856***</td>
<td>0.856***</td>
<td>0.327**</td>
</tr>
<tr>
<td>lnPOPi</td>
<td>0.884***</td>
<td>0.903***</td>
<td>0.886***</td>
<td>0.886***</td>
<td>0.200***</td>
</tr>
<tr>
<td>lnPOPj</td>
<td>0.850***</td>
<td>0.623***</td>
<td>-0.432**</td>
<td></td>
<td></td>
</tr>
<tr>
<td>lnPPPij</td>
<td>0.024</td>
<td>-0.072**</td>
<td></td>
<td></td>
<td>-1.103***</td>
</tr>
<tr>
<td>lnIOi</td>
<td>0.188***</td>
<td>-0.044***</td>
<td>0.184***</td>
<td>0.178***</td>
<td>0.446**</td>
</tr>
<tr>
<td>lnCDj</td>
<td>0.542***</td>
<td>0.452***</td>
<td>-1.825***</td>
<td>-1.322***</td>
<td></td>
</tr>
<tr>
<td>ln(distance/distance)</td>
<td>-1.854***</td>
<td>0.0002***</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Obs.</td>
<td>2617</td>
<td>2617</td>
<td>2643</td>
<td>2643</td>
<td>324</td>
</tr>
<tr>
<td>R²</td>
<td>0.815</td>
<td>0.754</td>
<td>0.822</td>
<td>0.822</td>
<td>0.467</td>
</tr>
</tbody>
</table>
Results

China
Hong Kong
Japan
Korea
Macau
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Conclusion

• Spatial interaction models provide another perspective to investigate tourism demand.
• SIM focuses on cross-section data and good at examining spatial configuration effects.
• The estimation results show high heterogeneity on the distance decay effects of the destination.
• Thank you!