Valuation of Aircraft Noise Annoyance: A Comparison of Approaches in the Context of Airport Relocation

A Presentation Outlining this PhD Research
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Presentation Outline

• Research Objectives

• General Background of the Areas

• Hedonic Pricing Models for Aircraft Noise Annoyance

• Stated Choice Experiments

• Originality of this work

• The Stage of the PhD Research at the Moment
Research Objective

To uncover the value placed on the aircraft noise annoyance by the residents of affected areas:

- by analysing the housing market variations (Hedonic Pricing Models)
- by examining residents’ responses to hypothetical choices and questions concerning aircraft noise. (Stated Choice Experiment)

This Research Objective will be realised by Analysing two rare occurrences for such research:

- A major Airport opening and an Airport closing
- Complete removal of aircraft noise in one case and the beginning of aircraft noise annoyance in the other case.
General Background of the Areas

- 280,000 people were affected by aircraft noise around Hellenikon Airport

- Hellenikon Airport was operating until March 2001

- Only Athens airport has been totally relocated the last decade in Europe

- Eleftherios Venizelos (E.V.) Airport was opened on March 2001

- Around 45,000 people reside near E.V. Airport. 10,000 of them are now having serious aircraft noise problem
Figure 1: A Map of the Transport Network for Metropolitan Athens Area
Figure 2: Aircraft Movement in Athens Airport

Arrivals and Departures

- 120,660
- 135,361
- 143,343
- 147,972
- 172,033
- 186,058
- 191,048
- 159,464
- 170,130

Years:
- 1995
- 1996
- 1997
- 1998
- 1999
- 2000
- 2001 (Apr-Dec)
- 2002
- 2003
- 2004
Figure 3: Noise Contours for Hellenikon Airport, 25 June 1998
Hedonic Pricing Models for Aircraft Noise Annoyance (1)

**Short Introduction**

- In housing market a hedonic pricing function is:
  \[
  \text{House Price} = f(\text{Structural characteristics, Environmental characteristics, Neighbourhood characteristics})
  \]
- Models are usually built examining the spatial variation of noise and house prices
- In literature, HP studies of aircraft noise, averagely estimate a 0.5%-0.6% per decibel depreciation on the price of a house (Nelson 2004).

**HP Method Limitations**

- The “spatial variation” is the biggest problem, because house prices in different areas are affects by many different factors that may not be in the HP model
- No indication of how the housing market would react to non-marginal noise changes
- Enormous data requirements
What is being done in this research

- A spatial HP model is created for 1998, when Hellenikon was in operation.
- A time series HP model is created from 1995-2003
- Comparing between time series and spatial HP models
- The noise indicators for different time periods are provided by EUROCONTROL
- We will use GIS models to calculate the neighbourhood variables for the housing sales data that are available to us.
Stated Choice (1)

Why is SC experiment interesting in the context of Airport Relocation?

- The attitude of people towards aircraft noise will be examined through both economic and attitudinal perspectives in the opposite noise change context.
- Opposite changes concerning aircraft noise
- Differing incentives to bias

In the Hellenikon SC experiment

- Direct comparison with HP model results
- Validation of SC results through HP
- Opportunity of running combined HP and SC models
Stated Choice (2)

SC experiment was designed so as to:

• Present the respondents of Hellenikon and E.V. Airports, with choices between familiar scenarios which represent the majority of changes that took place in their areas with the airport relocation.

• Connect to Hedonic Pricing Analysis, by exploring the choice of residential area that is determined by the amenities it provides.

• Keep the experiments in Hellenikon and E.V. Airports similar and directly comparable.

• Examine closely bias issues (strategic and hypothetical), in a situation that provides a unique perspective to the subject.
An example of a card from the E.V. Airport SC Experiment

The design requires 25 cards, 8 of which are given randomly to each respondent.

<table>
<thead>
<tr>
<th>ZIE</th>
<th>Scenario A</th>
<th>Scenario B</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Public Transport Travel Time to The Centre in Peak Hours</strong></td>
<td>5 less than your average travel time</td>
<td>As of now</td>
</tr>
<tr>
<td><strong>Light Rail Services</strong></td>
<td>Light Rail stop in walking distance from your house</td>
<td>No Light Rail stop in walking distance from your house</td>
</tr>
<tr>
<td><strong>Area Wide Road Traffic Congestion</strong></td>
<td>As of now</td>
<td>5% More traffic</td>
</tr>
<tr>
<td><strong>Aircraft Noise at Home</strong></td>
<td>You are not subjected to Aircraft Noise in your house</td>
<td>As of now</td>
</tr>
<tr>
<td><strong>Council Tax</strong></td>
<td>€10 More every month than the amount you pay now</td>
<td>As of now</td>
</tr>
<tr>
<td><strong>I Choose …</strong></td>
<td>A</td>
<td>B</td>
</tr>
</tbody>
</table>
Originality of this Research

- A few SC published studies on Aircraft noise valuation

- The respondents of SC did experience the noise changes of the experiment

- No published HP work on valuing aircraft noise in an airport relocation context (complete removal of aircraft noise)

- No published HP work comparing spatial and time series models

- No comparison in the literature, between SC and HPM aircraft noise valuation results of the same location.
The Stage of the PhD Research at the Moment

• The main SC survey started on the 13th of October and concludes at the end of November

• 1000 filled questionnaires are at our disposal, with a response rate around 30%

• The preliminary analysis of the SC data is under way

• All the data and tools needed for the Hedonic Pricing Models are available and will shortly be at our disposal. The analysis is starting.