Demand for ice hockey, the factors explaining attendance of ice hockey games in Finland

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Nelson (1970): search vs. experience goods

- search: consumer can value a product’s quality by inspection before buying it
- experience: the consumer must consume the product to determine its quality
- Most cultural events are experience goods: going to opera performance, sport events, movies
But some evidence about the quality can be get before consuming

- Opera, movies: critics review in newspapers, word-of-mouth
- Sport: past performance of the team (winning %)
- Problem in opera: all tickets sold before actual performance
- Problem in sports: visitor team changes
- Problem in movies: moviegoers are young (who do not read newspapers)
The study focuses on season 2007 – 2008 ice hockey league games in Finland.
The aim is to explain factors affecting attendance.
There are 14 teams playing in the highest level in Finnish men’s ice hockey league.
The regular season 2007 – 2008 was a four-fold series – i.e. 52 games per team – with teams located in Helsinki (HIFK and Jokerit) played extra four mutual games, two at home stadium and two at visitor’s stadium. In addition to that the remaining 12 teams played extra four games in subdivisions of three teams.
- Altogether each team played 28 home games and 28 games as visitor.
- During 2007-2008 regular season the number of games was $14 \times 28 = 392$ and the total attendance was 1964626 i.e. 5012 per game.
Factors affecting attendance

- Demand base, i.e. home town population → positive impact (wide literature)
- Ticket price → negative (usually inelastic)
- Previous performance, i.e. winning percentage of home team → positive
- Distance between home team and visitor’s home town → negative, i.e. "local games" attract more people
- Weekday effect: during weekends more
- Temperature for outdoor sports, like football (soccer), baseball: when colder then less attendance
Some mixed evidence: incomes, beginning of season, unemployment rate
- What is the impact of population of visitor’s town?
- Or visitor’s winning percentage?
- Winning percentage from the beginning of season or three last games (form guide)?
- Ice hockey is played indoors: temperature?
<table>
<thead>
<tr>
<th>variable</th>
<th>measure</th>
<th>source</th>
<th>expected sign</th>
</tr>
</thead>
<tbody>
<tr>
<td>interest towards the game, $i_{jk}$</td>
<td>home town population 31.12.2007 (logHPop)</td>
<td>Statistics Finland</td>
<td>+</td>
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<tr>
<td></td>
<td>visitor's town population 31.12.2007 (logVPop)</td>
<td>Statistics Finland</td>
<td>+</td>
</tr>
<tr>
<td></td>
<td>distance between home town and visitor's town (logDist)</td>
<td>Stadium address; <a href="http://www.sm-liiga.fi">http://www.sm-liiga.fi</a> distance: <a href="http://kartat.eniro.fi">http://kartat.eniro.fi</a></td>
<td>-</td>
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<td></td>
<td>home team's points per game (logHPoin): if zero, then replaced by 0,01</td>
<td>own calculations based on Jääkiekkokirja 2007-2008</td>
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<td></td>
<td>visitor's points from 3 last games (logVLast): if zero, then replaced by 0,01</td>
<td>own calculations based on Jääkiekkokirja 2007-2008</td>
<td>+</td>
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<tr>
<td></td>
<td>regional unemployment rate (Unempl)</td>
<td><a href="http://www.tem.fi">http://www.tem.fi</a></td>
<td>-</td>
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<tr>
<td>round, $\lambda(t - r)$</td>
<td>played games since the beginning of th season (logHGame) if zero, then replaced by 0,01</td>
<td>own calculations based on Jääkiekkokirja 2007-2008</td>
<td>-</td>
</tr>
<tr>
<td>ticket price, $p_{jk}$</td>
<td>ticket price (logPrice)</td>
<td>Jääkiekkokirja 2007 - 2008</td>
<td>-</td>
</tr>
<tr>
<td>temperature, $temp_{jk}$</td>
<td>temperature at nearest observation site (temp)</td>
<td><a href="http://www.tutiempo.net/">http://www.tutiempo.net/</a></td>
<td>?</td>
</tr>
<tr>
<td>weekday, $t_{jk}$</td>
<td>weekday, three dummies TU (tuessay) TH thursday), SA (saturday)</td>
<td></td>
<td>TU – TH – SA +</td>
</tr>
</tbody>
</table>
The first regular season games were played in September 2007 and the last in March 2008. After that some teams continued their games in play-offs and the champion (Kärpät) were known in mid April.

Roughly 31 % of the games were played on Saturdays, about 27 % on Thursdays and about 25 % on Tuesdays.

In addition to that a few games were played on Mondays (< 3 %), Wednesdays (< 5 %), Fridays (> 6 %) and Sundays (> 3 %).
A bit more often there were Monday games in bigger towns ($r = 0.109$) against teams from far away ($r = 0.106$).

There seems to have been more games on Fridays in bigger towns ($r = 0.121$) and that seems have been reducing Saturday games ($r = -0.128$).

Otherwise the weekday variables do not seem to correlate with other variables.
Stadia or halls have different price categories. During the season 2007 – 2008 e.g. the ticket price of Blues’s (Espoo) home games in club seats (201-206) was normally 27€, in the second long side (207-211) 24€, standing places (terraces) (212) 10€, gable seats lower (101-102) 18€, normal seat upper (401-406) 14€, disabled persons 14€, conscripts and students 10€ (normal seats upper, not Blues – HIFK, nor Blues – Jokerit), boxes for box owners 14€, and children under 7 years free if they were sitting on parent’s knees. Since Espoo and Helsinki are neighboring towns, the ticket prices for games against HIFK or Jokerit (both from Helsinki) were 2€ higher. These prices were valid only when the ticket is bought advance. When bought on entrance, there was 1€ increase. For empirical purposes the variation is very challenging and since there was no data concerning true distribution of seats taken, the empirical equivalent for price is usually the ticket price of best seat including local game excess fees. For Blues this price is 27€ or 29€ with HIFK or Jokerit as visitor team.
The correlation matrix reveals the ticket price seems to have been higher in larger towns.

Points per game from the beginning of the season (HPoint) and points from the last three games (Last3H) were also positively correlated.

Regional unemployment rate seems to have been higher in areas with smaller towns.
| variable    | coefficient (Model 1) | std (Model 1) | t-value (Model 1) | P (|T|>|t|) (Model 1) | coefficient (Model 2) | std (Model 2) | t-value (Model 2) | P (|T|>|t|) (Model 2) | coefficient (Model 3) | std (Model 3) | t-value (Model 3) | P (|T|>|t|) (Model 3) |
|-------------|-----------------------|--------------|------------------|------------------|-----------------------|--------------|------------------|------------------|-----------------------|--------------|------------------|------------------|
| constant    | 4,785                 | 0,403        | 11,87            | 0,000            | 4,596                 | 0,406        | 11,31            | 0,000            | 4,876                 | 0,418        | 11,68            | 0,000            |
| LogPrice    | -0,272                | 0,110        | -2,28            | 0,013            | -0,265                | 0,111        | -2,39            | 0,017            | -0,324                | 0,112        | -2,91            | 0,004            |
| LogHPop     | 0,355                 | 0,028        | 12,84            | 0,000            | 0,360                 | 0,028        | 12,89            | 0,000            | 0,365                 | 0,028        | 12,89            | 0,000            |
| LogVPop     | 0,047                 | 0,012        | 3,93             | 0,000            | 0,048                 | 0,013        | 3,98             | 0,000            | 0,044                 | 0,012        | 3,99             | 0,000            |
| LogDist     | -0,037                | 0,009        | -4,17            | 0,000            | -0,038                | 0,009        | -4,22            | 0,000            | -0,036                | 0,009        | -3,98            | 0,000            |
| LogHGame    | -0,032                | 0,013        | -2,44            | 0,015            | -0,032                | 0,013        | -2,41            | 0,016            | -0,026                | 0,011        | -2,44            | 0,015            |
| LogHPoin    | 0,083                 | 0,017        | 4,79             | 0,000            | 0,0846                | 0,017        | 4,87             | 0,000            |                      |              |                  |                  |
| LogVPoin    | -0,058                | 0,016        | -3,57            | 0,000            | -0,058                | 0,016        | -3,52            | 0,000            |                      |              |                  |                  |
| LogHLast    |                       |              |                  |                  |                      |              |                  |                  |                      |              |                  |                  |
| LogVLast    |                       |              |                  |                  |                      |              |                  |                  |                      |              |                  |                  |
| LogUnempl   | 0,083                 | 0,060        | 1,39             | 0,166            | 0,087                 | 0,061        | 1,44             | 0,151            | 0,071                 | 0,062        | 1,15             | 0,253            |
| Temp        | -0,005                | 0,002        | -2,00            | 0,046            | -0,005                | 0,002        | -2,02            | 0,044            | -0,004                | 0,002        | -1,83            | 0,068            |
| TU          | -0,111                | 0,023        | -4,88            | 0,000            | -0,106                | 0,023        | -4,88            | 0,000            |                      |              |                  |                  |
| TH          | -0,122                | 0,022        | -5,50            | 0,000            | -0,114                | 0,023        | -5,04            | 0,000            |                      |              |                  |                  |
| SA          |                      |              |                  |                  | 0,118                 | 0,020        | 5,75             | 0,000            |                      |              |                  |                  |

N = 392

$R^2 = 0.677$, $F = 75.34$, $\chi^2 = 453.62$, $DW = 2.00$

$R^2 = 0.672$, $F = 80.97$, $\chi^2 = 446.68$, $DW = 2.03$

$R^2 = 0.661$, $F = 70.53$, $\chi^2 = 436.08$, $DW = 1.96$
| variable    | coefficient | std  | t-value | P [|T|>|t|] | coefficient | std  | t-value | P [|T|>|t|] | coefficient | std  | t-value | P [|T|>|t|] |
|-------------|-------------|------|---------|----------|-------------|------|---------|----------|-------------|------|---------|----------|
| constant    | 4,706       | 0,420| 11,20   | 0,000    | 5,210       | 0,263| 19,78   | 0,000    | 5,039       | 0,265| 19,02   | 0,000    |
| LogPrice    | -0,318      | 0,112| -2,83   | 0,005    | -0,265      | 0,110| -2,42   | 0,016    | -0,258      | 0,111| -2,33   | 0,020    |
| LogHPop     | 0,369       | 0,029| 12,92   | 0,000    | 0,332       | 0,022| 15,01   | 0,000    | 0,336       | 0,022| 15,04   | 0,000    |
| LogVPop     | 0,044       | 0,013| 3,54    | 0,000    | 0,047       | 0,012| 3,93    | 0,000    | 0,048       | 0,012| 3,96    | 0,000    |
| LogDist     | -0,037      | 0,009| -4,02   | 0,000    | -0,036      | 0,009| -4,06   | 0,000    | -0,037      | 0,009| -4,11   | 0,000    |
| LogHGame    | -0,028      | 0,011| -2,39   | 0,017    | -0,033      | 0,013| -2,51   | 0,012    | -0,033      | 0,013| -2,49   | 0,013    |
| LogHPoin    | 0,083       | 0,017| 4,80    | 0,000    | 0,085       | 0,017| 4,87    | 0,000    | 0,085       | 0,017| 4,87    | 0,000    |
| LogVPoin    | -0,058      | 0,016| -3,53   | 0,000    | -0,058      | 0,016| -3,49   | 0,001    | -0,058      | 0,016| -3,49   | 0,001    |
| LogHLast    | 0,015       | 0,006| 2,70    | 0,007    |             |      |         |          |             |      |         |          |
| LogVLast    | -0,003      | 0,005| -0,60   | 0,549    |             |      |         |          |             |      |         |          |
| LogUnempt   | 0,073       | 0,062| 1,17    | 0,243    |             |      |         |          |             |      |         |          |
| Temp        | -0,004      | 0,002| -1,85   | 0,065    | -0,005      | 0,002| -2,31   | 0,021    | -0,005      | 0,002| -2,33   | 0,020    |
| TU          | -0,110      | 0,023| -4,85   | 0,000    |             |      |         |          |             |      |         |          |
| TH          | -0,122      | 0,022| -5,50   | 0,000    |             |      |         |          |             |      |         |          |
| SA          | 0,109       | 0,021| 5,29    | 0,000    |             |      |         |          |             |      |         |          |
| N           | 392         |      |         |          |             |      |         |          |             |      |         |          |
| N           | 392         |      |         |          |             |      |         |          |             |      |         |          |

Model 4: \( R^2 = 0.657 \)  \( F = 75.96 \)  \( \chi^2 = 429.83 \)  \( DW = 1.98 \)

Model 5: \( R^2 = 0.677 \)  \( F = 82.48 \)  \( \chi^2 = 451.64 \)  \( DW = 2.00 \)

Model 6: \( R^2 = 0.671 \)  \( F = 89.49 \)  \( \chi^2 = 444.56 \)  \( DW = 2.03 \)
| variable        | coefficient | std  | t-value | P [|T|>t] | coefficient | std  | t-value | P [|T|>t] |
|-----------------|-------------|------|---------|---------|-------------|------|---------|---------|
| constant        | 5,240       | 0,271| 19,28   | 0,000   | 5,080       | 0,273| 18,62   | 0,000   |
| LogPrice        | -0,318      | 0,111| -2,85   | 0,004   | -0,311      | 0,112| -2,78   | 0,006   |
| LogHPop         | 0,345       | 0,022| 15,44   | 0,000   | 0,348       | 0,023| 15,46   | 0,000   |
| LogVPop         | 0,044       | 0,012| 3,50    | 0,000   | 0,044       | 0,013| 3,54    | 0,001   |
| LogDist         | -0,036      | 0,009| -3,90   | 0,000   | -0,036      | 0,009| -3,93   | 0,000   |
| LogHGame        | -0,027      | 0,011| -2,54   | 0,009   | -0,027      | 0,011| -2,50   | 0,013   |
| LogHPoin        |             |      |         |         |             |      |         |         |
| LogVPoin        |             |      |         |         |             |      |         |         |
| LogHLast        | 0,014       | 0,005| 2,60    | 0,010   | 0,016       | 0,006| 2,83    | 0,005   |
| LogVLast        | -0,003      | 0,005| -0,57   | 0,570   | -0,003      | 0,005| -0,550  | 0,583   |
| LogUnempl       |             |      |         |         |             |      |         |         |
| Temp            | -0,005      | 0,002| -2,12   | 0,035   | -0,005      | 0,002| -2,14   | 0,033   |
| TU              | -0,106      | 0,023| -4,55   | 0,000   |             |      |         |         |
| TH              | -0,114      | 0,023| -5,04   | 0,000   |             |      |         |         |
| SA              |             | 0,108| 5,27    | 0,000   |             |      |         |         |

N = 392  
\( R^2 = 0,661 \)  
\( F = 77,39 \)  
\( \chi^2 = 434,73 \)  
\( DW = 1,96 \)  

\( R^2 = 0,657 \)  
\( F = 84,17 \)  
\( \chi^2 = 428,43 \)  
\( DW = 1,98 \)
Conclusions

- Both population of the home team and the visitor have a statistically significant effect on attendance as well as distance between home town and visitor’s town.
- Local games have a bigger attendance than other games.
- The demand is not elastic with respect to ticket price.
- Success of both the home team and the visitor has an effect: home team’s success with positive and visitor’s with negative coefficient.
- The number of plays already played has a negative effect
- Weekday effect is important: the attendance is bigger during Saturdays
- The day temperature has an effect: the colder, the bigger attendance
- The unemployment rate has no effect, and also the success factor of the last three games does not seem to explain as well as the success factor of all games played