International Seminar on Information and Communications Technology Statistics

Session 4: Measuring the Information Society

Digital divide: from computer access to online activities. A Micro data Analysis

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OUTLINE

- Context
- Objective
- Data
- Digital Divide
- Results
- Conclusion
- Policy context
Context

- Analysis based on micro data provides value added compared to aggregated data

- OECD projects
  - Digital Divide

- Digital competitiveness report for benchmarking European Information Society
Context (2)

- Complementing the paper on «Micro data analysis on the determinants of frequency of Internet use and downloading of audiovisual content» (October 2009)

- Using the same data source for the EU countries (micro data of the Community Survey on the use of ICTs in households and by Individuals) and methodology (logistic and linear regressions), enlarged to Korea

- Separate study for Canada also used for benchmarking
Objective of the study

- Feasibility of micro data analysis
- Considering socio-economic background characteristics, analyse determinants of:
  - Access and use / dropouts
  - Frequency of internet use
  - Downloading of audiovisual content
  - Scope of online activities (variety)
- As function of socio-economic background characteristics, applying Logistic (or Linear) Regression Models
Data availability

- Micro data on access and use of ICTs in households and by individuals
- 21 EU countries + Korea
  - 19 EU Member States
  - NO, IS
  - Sample size
  - 79 000 households 17 000 households
  - 166 000 individuals 41 644 individuals
  - DE, FR, PL, UK, RO missing
  - IT, ES almost half of total population
Digital Divide

**First level**
- Non access from home
- Non use
- Internet dropouts

**Second level**
- Intensity of Internet use
- Selected Internet activities
- Scope of Internet use
Digital Divide (2)

- Household composition
- Age
- Income
- Education attainment
- Density of population
- Gender (reference person)
- Employment situation
- Occupation *
- Broadband connection *
- Place of use *
- Tool to access the Internet *

Intensity
Activities + scope

1st level
(Non) Access + (Non) use

Internet dropout

2nd level *

Internet

computer
HAVING **ACCESS TO** \[ \begin{align*}
&\text{a computer} \\
&\text{the Internet}
\end{align*} \]

\textbf{Independant variable} \hspace{2cm} \textbf{Effect on the probability}

<table>
<thead>
<tr>
<th>Density of population</th>
<th>Increase</th>
</tr>
</thead>
<tbody>
<tr>
<td>Income (quartiles)</td>
<td>Increase</td>
</tr>
<tr>
<td>children</td>
<td>Increase</td>
</tr>
</tbody>
</table>
Having access to the Internet at home

**Odds Ratio estimates**

<table>
<thead>
<tr>
<th>Countries</th>
<th>All</th>
<th>max</th>
<th>min</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>model 1</strong></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Densely-populated area</td>
<td>1.340</td>
<td>2.786 Bulgaria</td>
<td>1.366 Italy</td>
</tr>
<tr>
<td>Intermediate area</td>
<td>1.012 †</td>
<td>2.342 Greece</td>
<td>1.368* Finland</td>
</tr>
<tr>
<td>lowest quartile</td>
<td>0.577</td>
<td>0.645 Finland</td>
<td>0.242 Cyprus</td>
</tr>
<tr>
<td>second highest quartile</td>
<td>2.024</td>
<td>3.676 Bulgaria</td>
<td>1.460 Austria</td>
</tr>
<tr>
<td>highest quartile</td>
<td>4.444</td>
<td>13.889 Portugal</td>
<td>2.611 Austria</td>
</tr>
<tr>
<td>1 adult with one or more children</td>
<td>2.882</td>
<td>27.027 Slovenia</td>
<td>2.237 Austria</td>
</tr>
<tr>
<td>2 adults</td>
<td>0.718</td>
<td>1.961 Norway</td>
<td>0.338 Cyprus</td>
</tr>
<tr>
<td>2 adults with one or more children</td>
<td>1.639</td>
<td>41.667** Norway</td>
<td>2.500 Greece</td>
</tr>
<tr>
<td>3 or more adults</td>
<td>1.323</td>
<td>7.407 Netherlands</td>
<td>1.642** Bulgaria</td>
</tr>
<tr>
<td>3 or more adults with 1 or more child.</td>
<td>1.664</td>
<td>17.544 Malta</td>
<td>2.299 Bulgaria</td>
</tr>
<tr>
<td><strong>model 2</strong></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>household with dependent children</td>
<td>1.862</td>
<td>7.752 Norway</td>
<td>1.508 Greece</td>
</tr>
</tbody>
</table>
## Internet intensive users

### Odds Ratio estimates (selected results)

<table>
<thead>
<tr>
<th>Explanatory variables (socio-economic background characteristics)</th>
<th>EU Intensive (daily)</th>
<th>Korea Intensive (daily)</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Age</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>16-24</td>
<td>1.283</td>
<td>1.637</td>
</tr>
<tr>
<td>25-34</td>
<td>1.112</td>
<td>1.225</td>
</tr>
<tr>
<td>45-54</td>
<td>0.847</td>
<td>0.805</td>
</tr>
<tr>
<td>55-64</td>
<td>0.858</td>
<td>0.824</td>
</tr>
<tr>
<td>65-74</td>
<td>0.690</td>
<td>0.458</td>
</tr>
<tr>
<td><strong>Gender</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Female</td>
<td>0.763</td>
<td>0.770</td>
</tr>
<tr>
<td><strong>Education</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>ISCED3</td>
<td>1.546</td>
<td>1.915</td>
</tr>
<tr>
<td>ISCED5</td>
<td>2.384</td>
<td>3.633</td>
</tr>
<tr>
<td><strong>Employment</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Unemployed</td>
<td>0.815</td>
<td>n.a.</td>
</tr>
<tr>
<td>Student (not in the labour force)</td>
<td>2.019</td>
<td>2.010</td>
</tr>
<tr>
<td>Other not in the labour force (retired, inactive, in compulsory military service, etc.)</td>
<td>0.577</td>
<td>0.781</td>
</tr>
<tr>
<td><strong>Density</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Densely-populated area</td>
<td>1.342</td>
<td>0.955</td>
</tr>
<tr>
<td>Intermediate area</td>
<td>1.290</td>
<td>n.a.</td>
</tr>
<tr>
<td><strong>Income</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Lowest quartile</td>
<td>1.021†</td>
<td>0.773</td>
</tr>
<tr>
<td>Second highest quartile</td>
<td>1.299</td>
<td>0.973</td>
</tr>
<tr>
<td>Highest quartile</td>
<td>1.685</td>
<td>0.955</td>
</tr>
</tbody>
</table>

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**Internet intensive users** (continued)

**Odds Ratio estimates (selected results)**

<table>
<thead>
<tr>
<th>Explanatory variables (socio-economic background characteristics)</th>
<th>EU</th>
<th>Korea</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Household composition</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>One adult with one or more children</td>
<td>0.884†</td>
<td>1.053</td>
</tr>
<tr>
<td>Two adults</td>
<td>0.753</td>
<td>0.968</td>
</tr>
<tr>
<td>Two adults with one or more children</td>
<td>0.555</td>
<td>0.897</td>
</tr>
<tr>
<td>Three or more adults</td>
<td>0.542</td>
<td>0.643</td>
</tr>
<tr>
<td>Three or more adults with one or more children</td>
<td>0.446</td>
<td>0.774</td>
</tr>
<tr>
<td>Household with a broadband connection</td>
<td></td>
<td>1.346</td>
</tr>
<tr>
<td>Individual having used Internet in the last 3 months at home</td>
<td></td>
<td>5.152</td>
</tr>
<tr>
<td>Individual having payed in the last 3 months for online audiovisual content</td>
<td></td>
<td>1.993</td>
</tr>
<tr>
<td>Individual accessing the internet with a mobile phone via GPRS</td>
<td></td>
<td>1.577</td>
</tr>
<tr>
<td>Individual accessing the internet with a mobile phone via UMTS (3G)</td>
<td></td>
<td>1.566</td>
</tr>
<tr>
<td>Individual accessing the internet with a handheld computer (palmtop, PDA)</td>
<td></td>
<td>2.160</td>
</tr>
<tr>
<td>Individual accessing the internet with a portable computer (laptop) via wireless connection away</td>
<td></td>
<td>2.185</td>
</tr>
<tr>
<td>C</td>
<td></td>
<td>0.787</td>
</tr>
</tbody>
</table>

Note: † indicates statistical significance.
## Scope of use – EU, Korea and Canada

**Linear regression, selected results**

<table>
<thead>
<tr>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Coefficient</td>
<td>Coefficient</td>
<td>Coefficient</td>
<td></td>
</tr>
<tr>
<td><strong>AGE</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>16-24</td>
<td>2.562</td>
<td>2.147</td>
<td></td>
<td></td>
</tr>
<tr>
<td>25-34</td>
<td>2.301</td>
<td>1.886</td>
<td></td>
<td></td>
</tr>
<tr>
<td>35-44</td>
<td>1.600</td>
<td>1.293</td>
<td></td>
<td></td>
</tr>
<tr>
<td>45-54</td>
<td>1.016</td>
<td>0.640</td>
<td></td>
<td></td>
</tr>
<tr>
<td>55-64</td>
<td>0.307</td>
<td>0.311**</td>
<td>-0.102</td>
<td></td>
</tr>
<tr>
<td><em>(reference group)</em></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>SEX</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>male</td>
<td>0.464</td>
<td>0.057*</td>
<td></td>
<td></td>
</tr>
<tr>
<td><em>(reference group)</em></td>
<td>female</td>
<td></td>
<td></td>
<td>-1.053</td>
</tr>
<tr>
<td>female</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>EDUCATIONAL LEVEL</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>primary or lower secondary education</td>
<td>-1.424</td>
<td>-1.887</td>
<td></td>
<td></td>
</tr>
<tr>
<td>upper secondary education</td>
<td>-0.665</td>
<td>-0.902</td>
<td></td>
<td></td>
</tr>
<tr>
<td><em>(reference group)</em></td>
<td>tertiary education</td>
<td></td>
<td></td>
<td>1.379</td>
</tr>
<tr>
<td><strong>TYPE OF LOCALITY</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>densely-populated area</td>
<td>0.378</td>
<td>0.239</td>
<td></td>
<td></td>
</tr>
<tr>
<td>intermediate area</td>
<td>0.103</td>
<td>n.a.</td>
<td></td>
<td></td>
</tr>
<tr>
<td><em>(reference group)</em></td>
<td>thinly-populated area</td>
<td></td>
<td></td>
<td>-0.252</td>
</tr>
<tr>
<td><strong>HOUSUELD INCOME</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>lowest quartile</td>
<td>-0.353</td>
<td>-0.427</td>
<td></td>
<td></td>
</tr>
<tr>
<td>second lowest quartile</td>
<td>-0.369</td>
<td>-0.393</td>
<td></td>
<td></td>
</tr>
<tr>
<td>second highest quartile</td>
<td>-0.228</td>
<td>-0.254</td>
<td></td>
<td>0.948</td>
</tr>
<tr>
<td><em>(reference group)</em></td>
<td>highest quartile</td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

*Results (2)*

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Conclusion and next steps

Influence of a number of socio-economic background characteristics on:

- non access to and non use of computer and the Internet
- intensity (frequency) of Internet use,
- propensity to undertake online activities,
- scope of Internet use

On non access, non use and dropouts:

- Low income is the single most important factor for non access to a computer and to the Internet
- The presence of children is the second most important factor for the access to a computer and to the Internet
- Living in a town in Europe increases the odds to have access to a computer and to the Internet by over 30% as compared to living in the countryside
- Elderly age and economic inactivity are by far the most important factors for having never used a computer or the Internet
Conclusion and next steps (2)

■ On intensity of internet use:
  – **Education** is the most important determinant of the intensity of Internet use
  – Being **student** is the second most important determinant of the intensity of Internet use
  – **Income** (in Europe) and **broadband access** (in Korea) are the respective third factor explaining the intensity of Internet use

■ On scope:
  – Young **age** and higher **education** are the main determinants for the scope of Internet use in Canada, Europe and Korea

■ Potential risk of a growing second level digital divide
  (cumulative dimension of the frequency of use and the effects of education and age)

■ Results preliminary. Include other countries (i.e. United States)
Policy context

- How could the analysis contribute to policy measures?
- An example
  - Multivariate analysis of phenomena
  - Analysis of composition of population to define target population for policy measures
  - Analysis of additional characteristics, e.g. place of access to computer
  - Identification of specific interests of target population
    - What are the preferred online activities?
  - Definition of initiatives for attracting persons to using the internet
Composition of Population by Age and Education

Source: Eurostat, survey on ICT usage in households and by individuals 2008

8.5% of total population
Places of Internet Access

Source: Eurostat, survey on ICT usage in households and by individuals 2008
Preferred Activities

Source: Eurostat, survey on ICT usage in households and by individuals 2008
Thank you for your attention

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