How does transport supply and mobility behaviour impact preferences for MaaS bundles? A multi-city approach

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Applied definition for Mobility-as-a-Service

«MaaS is a framework for delivering a portfolio of multi-modal mobility services that places the user at the centre of the offer.»
Integrating bundles into MaaS

- Separate services
- Information
- Booking & payment
- Bundle plans
- Societal goals
Current relevant work about MaaS

- Mode choice behaviour
  - Motorized individual transport in focus (Storme et al., 2020)
  - Multimodality partly in focus (Matyas & Kamargianni, 2021)

- Bundling
  - PT bundles more attractive (Tsouros et al., 2021)
  - Tendency towards non-usage of bundles (Caiati et al., 2020)

→ Effect of different shared modes towards bundle choice?
→ Role of prevailing transport supply and city characteristics?
Approach: Combination of data sets

Survey data
- MaaS bundle choice
- socio-demographics
- mobility tools
- current mode choice
- zip code
- ID: id

Supply data
- supply of shared mobility services in cities
- ID: city

Zip code data
- zip codes of cities
- ID: city

Localised survey data incl. supply data
- survey data
- supply data
- ID: id

Municipality data (Destatis)
- city name
- municipal indicator
- ID: ARS

Localised city characteristics
- city characteristics
- city name
- ID: city

Analysis data set
- ID: id
Survey data: MaaS bundle choice

- Stated preference experiment: 4 choice sets per 8 blocks
- Population: People living in major German cities (83)
- \( n = 471 \)
## Description of sample

<table>
<thead>
<tr>
<th>Variable</th>
<th>Sample</th>
</tr>
</thead>
<tbody>
<tr>
<td>Gender</td>
<td>Female</td>
</tr>
<tr>
<td>Age</td>
<td></td>
</tr>
<tr>
<td>18-39</td>
<td>38 %</td>
</tr>
<tr>
<td>40-59</td>
<td>47 %</td>
</tr>
<tr>
<td>&gt; 60</td>
<td>15 %</td>
</tr>
<tr>
<td>Monthly household net income(^a) [EUR]</td>
<td></td>
</tr>
<tr>
<td>&lt; 999</td>
<td>7 %</td>
</tr>
<tr>
<td>1,000-2,999</td>
<td>46 %</td>
</tr>
<tr>
<td>3,000-4,999</td>
<td>33 %</td>
</tr>
<tr>
<td>&gt;5,000</td>
<td>9 %</td>
</tr>
<tr>
<td>Ø no. cars in household</td>
<td>2</td>
</tr>
<tr>
<td>PT pass</td>
<td>56 %</td>
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</tbody>
</table>

\(^a\) Rest to 100% is none-response
### Impact of mobility behaviour on bundle preferences

<table>
<thead>
<tr>
<th></th>
<th>„Micro“</th>
<th></th>
<th>„Moto“</th>
<th></th>
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<tbody>
<tr>
<td></td>
<td>Bundle</td>
<td>PAYG</td>
<td>$\chi^2$</td>
<td>Bundle</td>
</tr>
<tr>
<td><strong>Cars in household</strong></td>
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<td></td>
<td></td>
<td></td>
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<tr>
<td>0</td>
<td>+0.4</td>
<td></td>
<td>***</td>
<td>+8</td>
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<tr>
<td>1</td>
<td>+3</td>
<td></td>
<td></td>
<td>+4</td>
</tr>
<tr>
<td>2</td>
<td>+0.1</td>
<td></td>
<td></td>
<td>+3</td>
</tr>
<tr>
<td>&gt;2</td>
<td>+3</td>
<td></td>
<td></td>
<td>+1</td>
</tr>
<tr>
<td><strong>Private e-scooter</strong></td>
<td></td>
<td></td>
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<td></td>
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<tr>
<td>yes</td>
<td>+15</td>
<td></td>
<td>***</td>
<td>+11</td>
</tr>
<tr>
<td>no</td>
<td>+15</td>
<td></td>
<td></td>
<td>+11</td>
</tr>
<tr>
<td><strong>PT pass</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>yes</td>
<td>+19</td>
<td></td>
<td>***</td>
<td>+29</td>
</tr>
<tr>
<td>no</td>
<td>+19</td>
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<td>+29</td>
</tr>
<tr>
<td><strong>Shared mobility usage</strong></td>
<td></td>
<td></td>
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<td></td>
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<tr>
<td>frequently</td>
<td>+6</td>
<td></td>
<td>***</td>
<td>+5</td>
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<tr>
<td>regularly</td>
<td>+3</td>
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<td>+5</td>
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<td>seldom</td>
<td>+6</td>
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<td>+9</td>
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<tr>
<td>never</td>
<td>+15</td>
<td></td>
<td></td>
<td>+19</td>
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</tbody>
</table>
Impact of shared mobility supply on bundle preferences

E-scootersharing supply density

- Bundle A
- Bundle B
- Bundles Total
- PAYG

Bikesharing supply density
Results

• PT pass holders favour bundles
• „Micro“ chosen by respondents with fewer cars
• „Moto“ chosen by respondents with more cars

• Previous use of shared modes increases bundle choice
• Owning vehicles increases bundle choice

• Threshold-effect for shared mobility supply
Implications

- Integrating different modes in bundles mean different choices
- Choosing a bundle does not make shared mobility enthusiasts
- Take care of “undesired” mode shifts
- Cities need to finetune shared mobility supply
Future work

• Integrate socio-demographic, mobility behaviour, and supply characteristics in modelling approach

• Decompose shared mobility supply in cities
• Control for residence of respondents
Thanks!

Questions?


