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Drivers of cycling demand and cycling futures in the Danish context.

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Approach

• Analysis of the time trend in cycling mode share based on longest possible time series

• Logistic regression model of cycling as mode choice as basis for studying ‘driver variables’ contribution to time trend.

• Describing important vectors of change behind the time trend
Data

- Danish National Travel Survey (TU)


- One day of travel for 10000 Danish resident individuals per survey year

- Some breaks in datasets and variables over time

- Analysis in this presentation is mainly based on 1995-2014 and respondents age 16-74 (N=654203 trips) for comparability and availability of explanatory variables.

- Variables available for 1995-2014 include: age, gender, occupation, accommodation, home ownership, family type, drivers license and car ownership.

- An indicator of spatial integration/regionalisation is developed based on survey average trip lengths by municipality and year (endogeneity issue!).
Trend: cycling mode share 1992-2014*

* Source: National Travel survey (TU), cycling mode share of all trips by 16-74 year olds living in Denmark, N=747633 trips
Trend in bicycle share by municipality 1995-2013

- Large decline (-0.4 to -0.2)
- Decline (-0.2 to -0.1)
- No significant changes
- Growth (0.1 to 0.13)
- High growth (0.27 to 0.5)
# Correlation and driver changes 1995-2013

<table>
<thead>
<tr>
<th>Correlation with cycling</th>
<th>Change in driver 1995-2013</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Winter</strong></td>
<td></td>
</tr>
<tr>
<td>Less likely to bicycle in winter (Dec, Jan, Feb)</td>
<td>No</td>
</tr>
<tr>
<td><strong>Gender</strong></td>
<td></td>
</tr>
<tr>
<td>Women are more likely to cycle</td>
<td>no</td>
</tr>
<tr>
<td><strong>Occupation</strong></td>
<td></td>
</tr>
<tr>
<td>Students and pupils more likely to cycle; self employed less</td>
<td>More students and retirees; fewer housewives</td>
</tr>
<tr>
<td><strong>Accommodation</strong></td>
<td></td>
</tr>
<tr>
<td>Multi story dwellings linked to cycling; farm houses link to less cycling</td>
<td>New dwelling types (dormitories etc.)</td>
</tr>
<tr>
<td><strong>Home ownership</strong></td>
<td></td>
</tr>
<tr>
<td>Renters and shared owners more likely to cycle</td>
<td>Fewer renters</td>
</tr>
<tr>
<td><strong>Family type</strong></td>
<td></td>
</tr>
<tr>
<td>Couples less likely to cycle than singles</td>
<td>More singles, fewer couples with children</td>
</tr>
<tr>
<td><strong>Age cohorts</strong></td>
<td></td>
</tr>
<tr>
<td>Older cohorts are more likely to cycle (exception is the oldest 1918-1930 cohort)</td>
<td>General shift from older to younger cohorts (ageing)</td>
</tr>
<tr>
<td><strong>City size (population)</strong></td>
<td></td>
</tr>
<tr>
<td>Residents of large cities are more likely to cycle</td>
<td>Average city size is increasing (13%) (migration)</td>
</tr>
<tr>
<td><strong>Population density</strong></td>
<td></td>
</tr>
<tr>
<td>Residents of dense municipalities are more likely to cycle</td>
<td>Average density is increasing (6%) (migration)</td>
</tr>
<tr>
<td><strong>Drivers license</strong></td>
<td></td>
</tr>
<tr>
<td>License holders are less likely to bicycle</td>
<td>Growth in licenseholding (7%)</td>
</tr>
<tr>
<td><strong>Car in household</strong></td>
<td></td>
</tr>
<tr>
<td>Car owners are less likely to bicycle</td>
<td>Growth in carownership (8%)</td>
</tr>
<tr>
<td><strong>Trip lengths (municipality)</strong></td>
<td></td>
</tr>
<tr>
<td>Long average triplenghts makes it less likely to bicycle</td>
<td>Strong growth in average triplenghts (31%)</td>
</tr>
</tbody>
</table>
Main change processes

Demographic and socioeconomic change
  Occupation, accommodation, home ownership, family type and age cohort

Urbanisation
  Population size and density

Motorisation
  Drivers license and car ownership

Regionalisation
  Average trip lengths for residents of municipalities
Vectors of change in cycling share 1995-2013

Changes to probability of cycling due to changes in drivers

1995 2013

- General trend
- Demographic and socioeconomic change
- Urbanisation
- Motorisation
- Regionalisation

Combined partial effects of variables and variable changes 1995-2013. Effects of demographics and urbanisation without control for motorisation and trip lengths are shown.
Summary

- Cycling mode share in Denmark has seen a negative time trend between 1995 and 2013.
- There are substantial trend differences between cities, their hinterlands og more remote areas. From large increases over large declines, to status-quo.
- The negative time trend may be partially explained by a combination of unfavorable demographic and socio-economic changes.
- Changes to car access (motorisation) and trip lengths (regionalisation) can account for the rest – and more so.
- The ongoing urbanisation makes a positive contribution to cycling – but only partially counterbalances the negative influence of other changes.
- Especially the increasing regionalisation where commuting, shopping etc. increasingly involve ‘interurban’ travel stands out as a major challenge to cycling modeshare.
There is much more work to do...

• Inclusion of additional variables such as income. (comparability issues to be solved)

• Analysis of change in recent years (2006-2014) will allow better modelling - and fuller elaboration of change vectors.

• Narrowing of ‘time window’ for analysis post requirements of explicit treatment of weather (e.g. long and cold winters) as well as specific events and incidences e.g. the role of the financial crisis for the trends after 2006/7.

• Elaboration of processes of regionalisation and increasing trip lengths. Notably the interaction between urbanisation and regionalisation processes.

• Elaboration of trend variation by geographical context – and exchange between cycling and walking modes.