Land use effects of road pricing – a literature review

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Why road pricing?

- Increasing traffic volumes in agglomerations
- Budget constraints
- Successful introductions of road pricing elsewhere
- Technical feasibility proved
- Increased acceptance
Status in Switzerland

- Heavy vehicle fee is implemented
- Federal administration is open for trials with private cars
- No legal authorisation so far, but exceptions - possible
- Research programme is underway
## Types of road pricing

<table>
<thead>
<tr>
<th>Methodology</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>Passage pricing</td>
<td>Gained eligibility for paying</td>
</tr>
<tr>
<td>Object pricing</td>
<td>Using bridges, tunnels or particular sections of a road</td>
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<tr>
<td>Cordon pricing</td>
<td>Crossing the cordon limit in or out</td>
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<tr>
<td>Motorway pricing</td>
<td>Time dependent</td>
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<tr>
<td>Time dependent</td>
<td>Using a motorway for the paid period</td>
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<tr>
<td>Distance or route dependent</td>
<td>Using a motorway section</td>
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<tr>
<td>Area pricing</td>
<td>Area licensing</td>
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<tr>
<td>Area licensing</td>
<td>Using all streets within priced area during the paid period</td>
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<tr>
<td>Area charging</td>
<td>Distance dependent fee for use of all streets within charged area</td>
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<td>Differentiated area charging</td>
<td>Distance or route dependent, differentiated by street type within charged area</td>
</tr>
<tr>
<td>Value pricing</td>
<td>Using separated lines on motorways</td>
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</tbody>
</table>

Source: adjusted from Rapp (2004)
Reactions to road pricing

Short-term adjustments:
- transport mode
- route choice
- departure time
- trip frequency/trip chaining

Long-term adjustments:
- car ownership
- public transport pass ownership
- destination choice
- location choice
Cheap propaganda or reality?

Source: http://www.no-congestion-charge.com
Overall spatial effect at urban scale

Concentration or deconcentration?
Arguments and spatial effects

- Low cost of transport argument
- Geographic concentration argument
- Rent seeking argument
- Different sensitivity of firms and households
- If cost burden is high, relocation might be considered
- Spatial effect of road pricing might be hidden by other factors in the urban economy
How to find out?

Empirical analytical studies (ex-ante)

Empirical analytical studies (ex-post)

Applied modelling studies
Empirical-analytical studies (ex-ante)

Two stated preference surveys (Tillema et al. 2006)
- 5% would move because of road pricing
- 13.5% would change job
- but majority of them stated that they will change location anyway

- Higher sensitivity to travel costs than to equally high housing costs
- Travel time is less important

=> Preference for higher housing costs and longer travel times in order to avoid higher travel costs
Empirical-analytical studies (ex-post)

No detailed study reported in the literature

Congestion charging zone in London (since 2003)
- rents are stable
- Marginal economic activity changes
- data inconsistency
- revenue loss in retail sector, but no location changes so far
- isolated effect of congestion charging unclear
Applied modelling approaches

General equilibrium modelling
Land use – transport modelling
**Land use - transport modelling**

- Several international applications at urban level
- Various models and cities

Examples: Austin (DRAM-EMPAL/TransCAD), Bilbao (MEPLAN), Brussels (TRANUS), Dortmund (IRPUD), Edinburgh (DELTA/START), Helsinki (MEPLAN), Inverness (TRANUS), London (LASER, LTM/LRM), Naples (MEPLAN), Newcastle (CITIES), Oslo (TRAM), Venice (MEPLAN)

Results:
- Spatial effects of road pricing are marginal
- Design of the charging scheme is crucial
- PROPOLIS: slight increase of population and decrease of employment in charged area (Lautsi et al. 2004)
Conclusions

- (Spatial) effects of road pricing are complex
- Empirical data sources are scarce
- Problem of isolating road pricing effects
- All available evidences are pointing to rather marginal spatial impacts

- Detailed study of spatial effects requires consideration of spatial structures and conditions
- Spatial effects vary among time and space as well as agents (households, firms)
Literature I


Literature II


Royal Institute of Chartered Surveyors (2004) RICS research into the impact of congestion charging on London property, London.

Royal Institute of Chartered Surveyors (2005) RICS research into the impact of congestion charging on London property, London.


Tillema, T., D. Ettema and B. van Wee (2005) Road pricing and (re)location decisions of households, paper, 45th Congress of the European Regional Science Association, Amsterdam, August.
