

# Preferred citation style

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# Wie schafft Erreichbarkeit Werte? How does accessibility create value ?

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# Constant time budget ? Externalities ?

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Doubts about infrastructure investments:

- If the time budget is constant ....
- Can we afford more CO<sub>2</sub> ?

Doubts about cost-benefit analysis:

- Completeness of monetarised effects
- Completeness without land-use modelling

# Terminology

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- Access:

Ability to reach a location in a given time

- Accessibility

within

Number of all opportunities reachable

a given time frame

# Elements of the benefits

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- Less scheduled delays
- Higher reliability
- Preferred mode available
- (Lower generalised costs of travel/more accessibility)
- Preferred destination reachable
  
- Better matching in housing and labour markets
- Higher productivity of (more) social capital
- Higher industrial productivity
- More innovation
  
- Higher land values

# Elements of the costs

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- Investment costs
- Operating costs/subsidies of users and infrastructure owners
- Externalities (noise, air, climate, injuries & health, severance, bio-diversity, etc.)
- Transition costs due to displacement of persons and economic activity

# Measuring accessibility (1)

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A simple start:

$$A_i = \sum_{\substack{tt_{ij} \leq tt_{\max} \\ \forall j}} X_j e^{\alpha tt_{ij}}$$

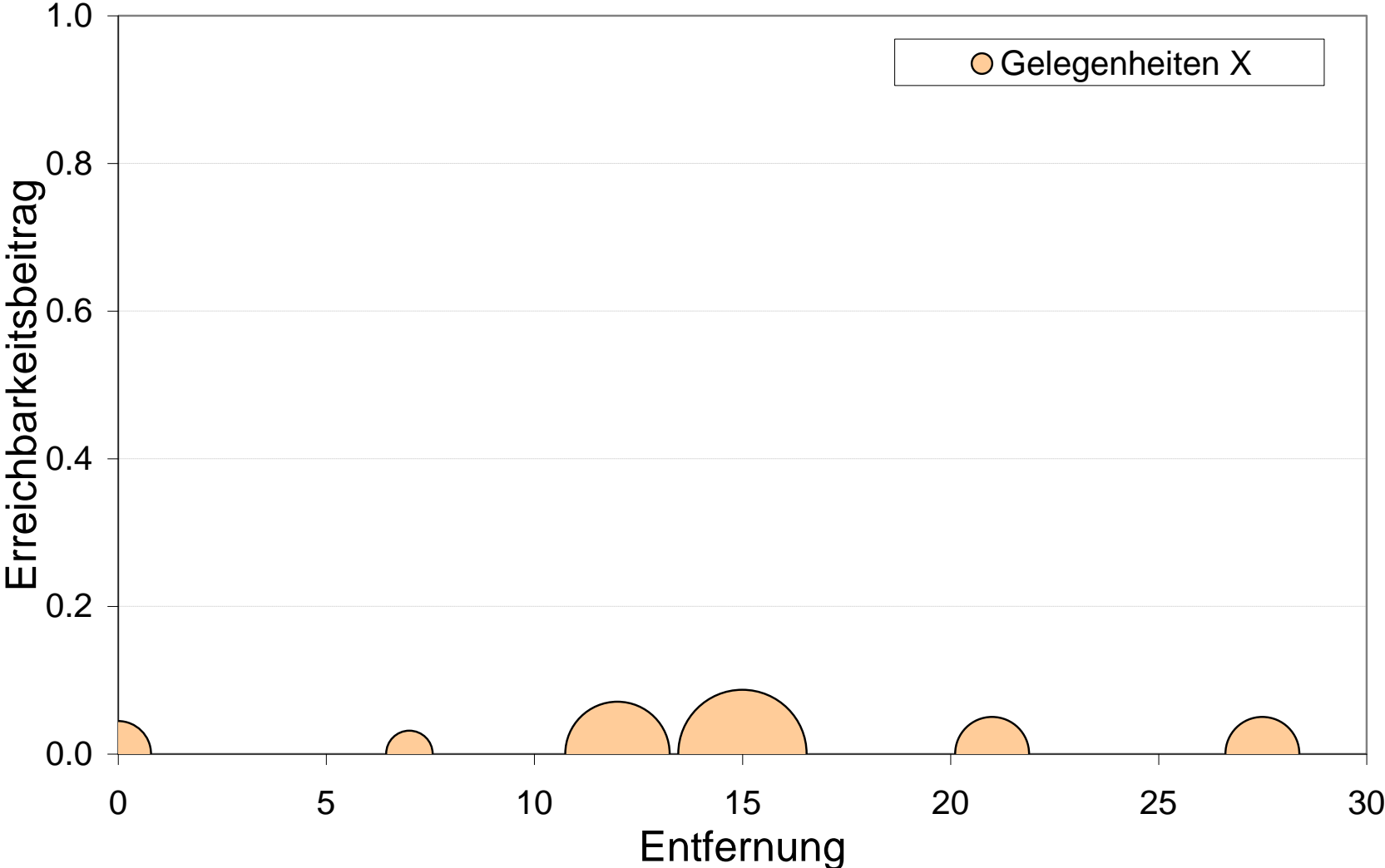
$A_i$  Accessibility of location  $i$

$tt_{ij}$  Travel time between location  $i$  and  $j$

$X_j$  Number of opportunities at location  $j$

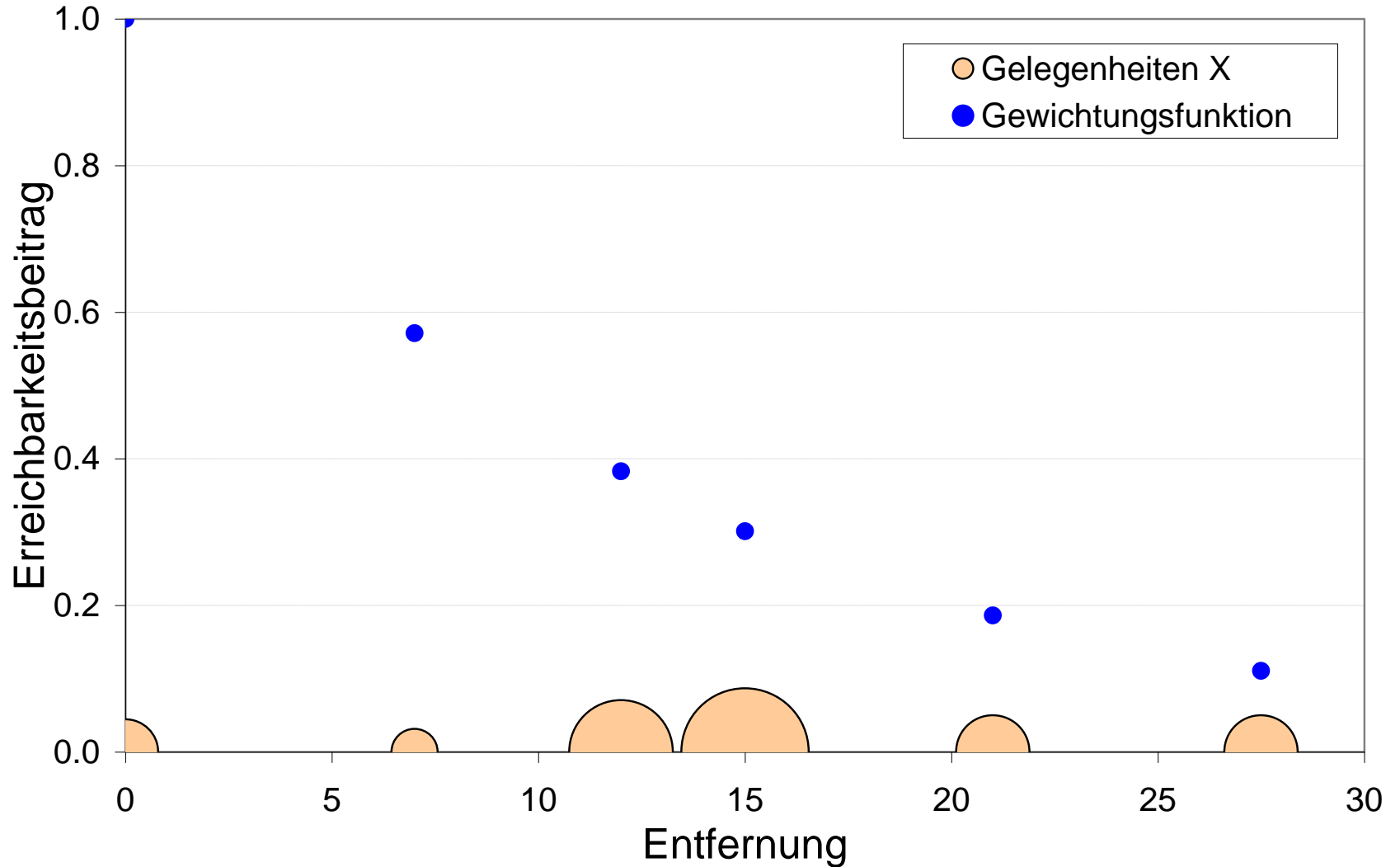
$\alpha$  Parameter;  $\alpha < 0$

# Calculating accessibility: Step 1

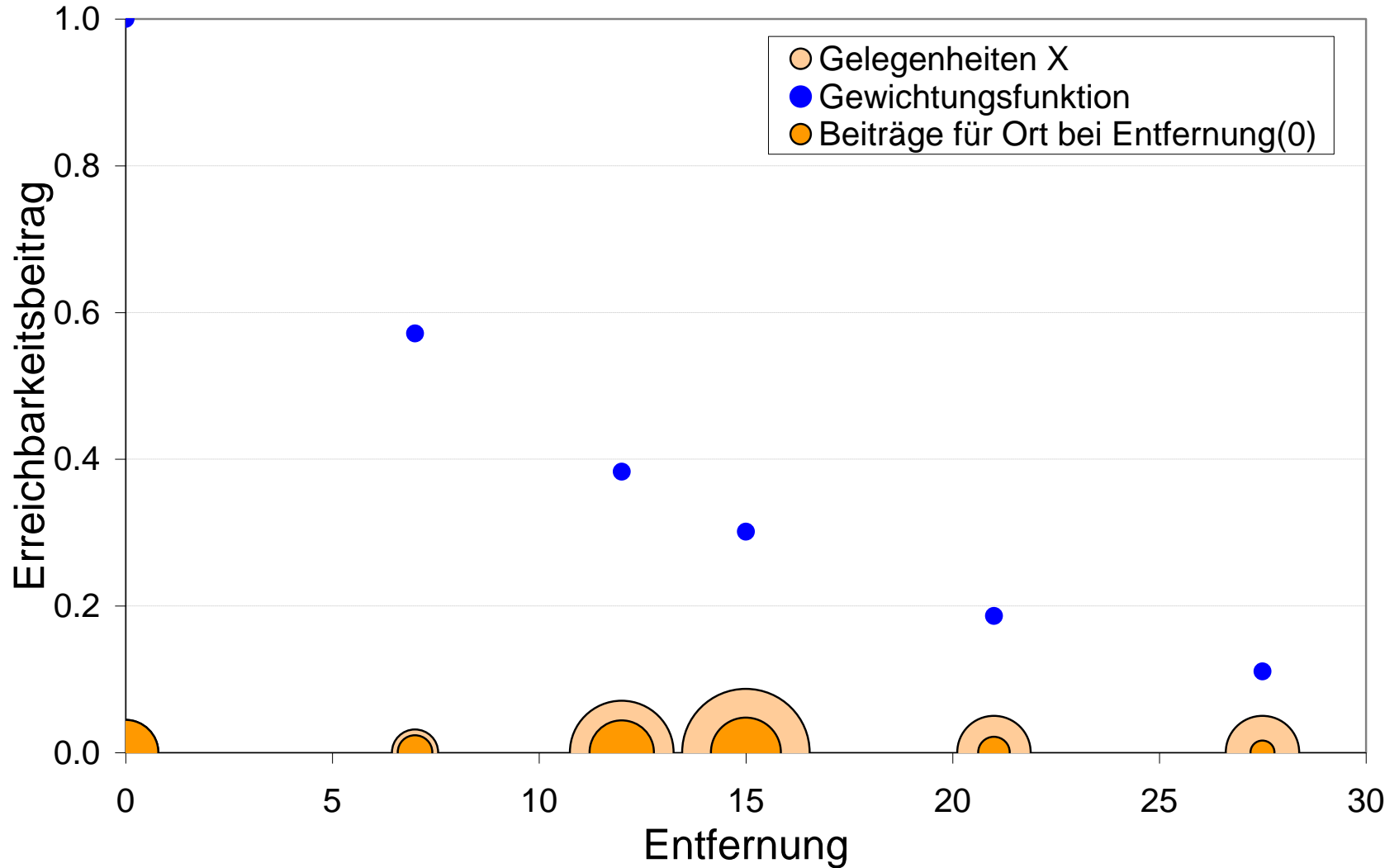




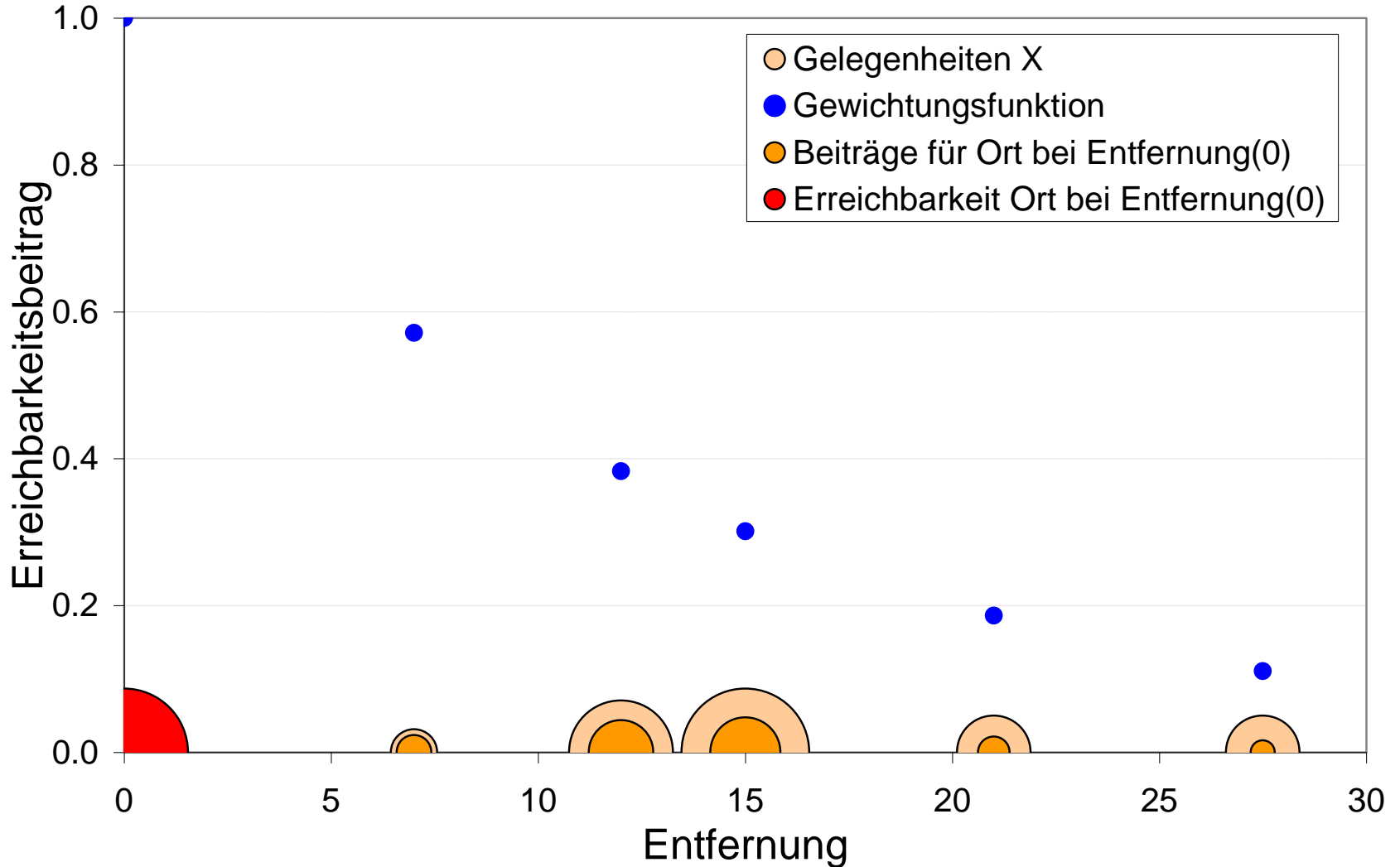
# Calculating accessibility: Step 2



# Calculating accessibility: Step 3



# Calculating accessibility: Step 4



## Measuring accessibility (2): log sum of a choice model

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Reformulating:

$$\begin{aligned} A_j &= \ln \sum_{\forall j}^{k_{ij} \leq \infty} e^{\ln X_j + \alpha k_{ij}} \\ &= \frac{1}{\mu} \ln \sum_{\forall j}^{k_{ij} \leq \infty} e^{\mu \ln X_j + \mu \beta I_{ij}} \\ &= \frac{1}{\mu} \ln \sum_{\forall j} e^{\mu V_j} \end{aligned}$$

# Questions

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What to measure ?

- (Short term) scheduling changes
- (Longer term) changes in pre-commitments
- (Longer term) changes in land values and productivity

How to measure ?

- (CBA-style) monetarised changes
- (Simple) accessibility + monetarised externalities
- Expected maximum utility (log sum) across all choice dimensions + monetarised externalities

# Appendix

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## Recent SEM estimates: 1970's- Swiss MZ and networks

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<b>Demand elasticity</b>	<b>Accessibility</b>	<b>Price index</b>
Share of out-of-home days	0.61	-0.06
Number of trips	0.44	-0.19
Number of trips per tour	0.24	-1.66
Total out-of-home duration	0.10	-1.95
Total trip distance	1.14	-0.84