

# Carpooling and Carsharing in Switzerland: Stated Choice Experiments

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# Project ASTRA 2008/017 - Participants

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# Goals

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- Estimation of Carpooling potential in Switzerland regarding:
  - Users
  - Traffic reduction
  - Environmental impact reduction
  - Mobility improvement
- The potential is estimated quantitatively using a simulation, which is based on the results of a nationwide survey

# Contents of the Survey

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- Qualitative questions on car-pooling
- Questions on socio-demographics
- *Stated choice* - experiments on car-pooling and car-sharing

# Recruitment

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- Basis: „Kontinuierliche Erhebung Personenverkehr (KEP)“ of SBB (Swiss train company)
- Time span (two Phases): Between 23. August and 25. October 2010 and 1. January and 18. April 2011
- Pre-condition: Driving license + Trip > 10km
- 1'683 Persons recruited (out of 2000 addresses)
- Expected (estimated) Response rate: 45%
- Actual Response Rate: 53%

# Statistics: Sample vs. Micro-census

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- Gender= + Male
- Age: - Young + Middle Age
- Education: ++ Tertiary
- Household Size: + Larger households
- Cars in the household: + Multiple cars ( $\geq 2$ )
- Public Transport Season Tickets: + HF + GA
- Income: + Affluent

# ***Stated choice Experiments***

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- Two SC Experiments, respectively on Car-pooling and Car-sharing, per Person
- Car-pooling:
  - 8 Situations
  - 4 possible Alternatives (CP Driver, CP Passenger, Private Car, PT)
  - 3 Alternatives per Person
  - Gasoline cost as basis
- Car-sharing
  - 6 Situations
  - 3 possible Alternatives (CS, PC, PT)
  - Global costs as basis
- Design
  - Ngene software

# Stated choice - Questionnaire

Car-Pooling als Fahrer			
Fahrtkosten	1.5	Chf	
Parkplatzkosten	4.0	Chf	
Fahrtzeit	25	Min	
Fusswegzeiten	5	Min	
als Mitfahrer			
Risiko sich zu verpassen	4	/Jahr	

PW Alleinfahrer			
Fahrtkosten <sup>1</sup>	3.0	Chf	
Parkplatzkosten	4.0	Chf	
Fahrtzeit	20	Min	
Fusswegzeiten	5	Min	

Öffentlicher Verkehr			
Fahrtkosten <sup>2</sup>	5.6	Chf	
Fahrtzeit <sup>3</sup>	30	Min	
Fusswegzeiten <sup>4</sup>	5	Min	
Wartezeit	7	Min	
Umsteigen	1	Mal	

Ihre Wahl



# Modal choice - Carpooling

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## Revealed Choice

- Car = 68.4%
- Car Passenger = 11.1%
- Other = 0.5%
- PT = 19.9 %

## Stated Choice

- Car = 39.8%
- CP Passenger = 35.0%
- CP Driver = 16.3%
- PT = 8.9%

# Stated Choice Model: Carpooling

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	Car Alone	CP Driver	CP Passenger	PT
Travel Cost	-0.06	-0.06	-0.06	-0.06
Walking Time	-0.04	-0.04	-0.04	-0.04
Travel time	-0.03	-0.03	-0.04	-0.01
Inertia	<b>0.77</b>	-	-	<b>2.07</b>
Transfers Time	-	-	-	-0.08
Transfers (n)	-	-	-	-0.10
Season Ticket	-	-	-	0.90
Male	0.65	-	-	-
Parking Cost	-0.06	-0.15	-	-
Car Always	0.40	-	-	-
Trip mate Colleague	-	<b>0.30</b>	0.30	-
Household Dimension	-	<b>0.09</b>	0.09	-
Positive attitude CP	-	<b>0.98</b>	0.98	-
Female	-	<b>-0.64</b>	-0.64	-
German Speaking	-	<b>0.17</b>	0.17	-
Constant	-0.33	0.23	-	-6.54

Observations: 5885 Adj. r2: 0.221

# Trade-offs: Car-pooling

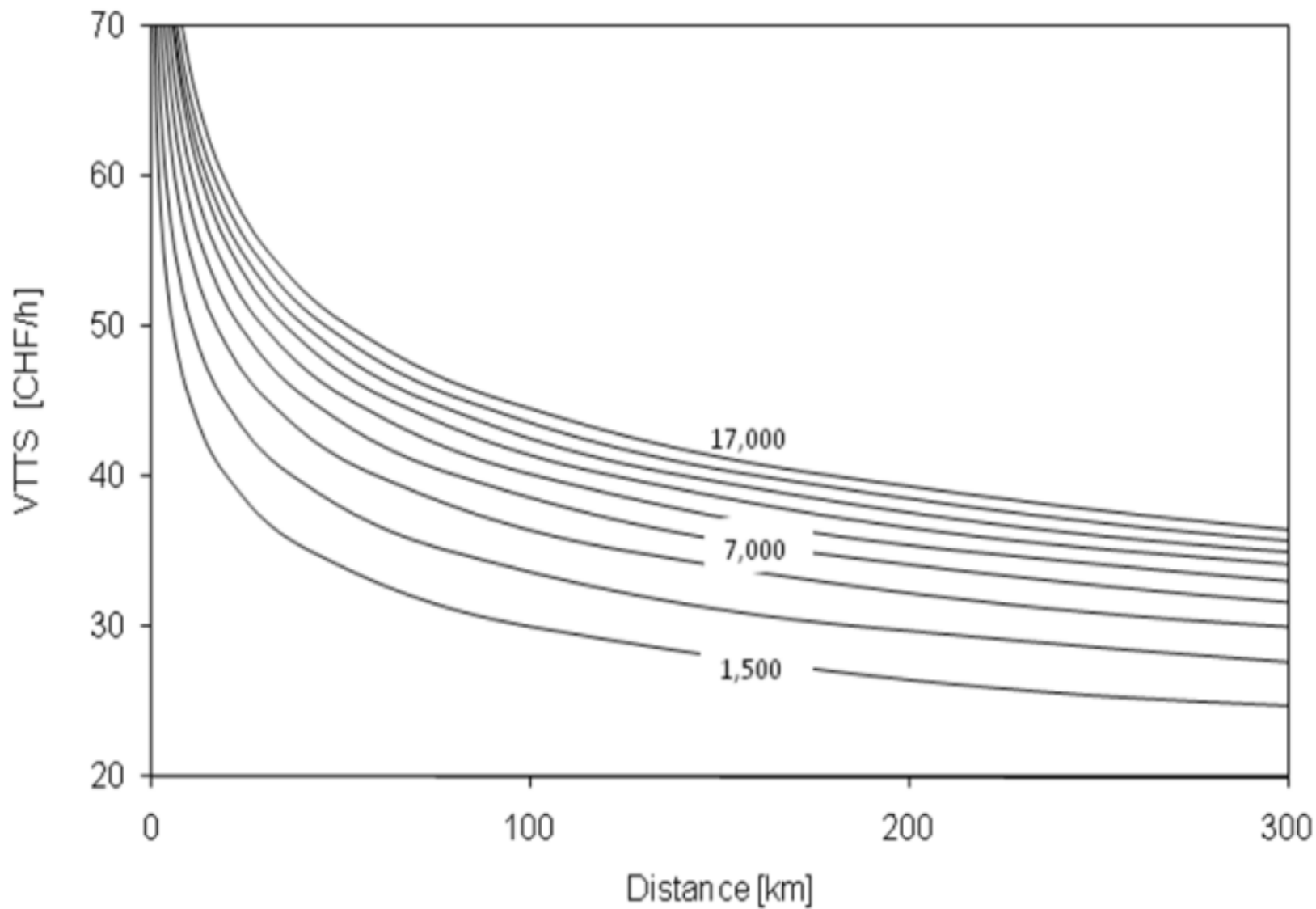
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Indicator	Unit	Value	VSS Norm SN 641 822 (2007)
VTTS CPD	CHF/h	36.7	-
VTTS CPP	CHF/h	40.0	-
VTTS Car	CHF/h	31.7	22.2
VTTS PT	CHF/h	8.2	13.8
WTP PT Transfers (#)	CHF/Transfer	1.8	2.5
WTP PT Transfer Time	CHF/h	84.3	6.5
WTP Walking Time	CHF/h	46.2	-

Average Income = 8,300 CHF/Month

Average Trip Distance = 38.1 Km

# Interactions distance-income on VTTS - Carpooling



## Modal choice - Carsharing

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### Revealed Choice

- Car = 68.4%
  - Car Sharing 0.5% (Est.)
- Public Transport = 19.9 %
- Car Passenger = 11.1%
- Other = 0.5%

### Stated Choice

- Car = 51.2%
- Carsharing = 14.9%
- Public Transport = 33.9%

# Stated Choice Model: Carsharing

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	Private Car	Carsharing	PT
Travel Cost	-0.01	-0.02	-0.03
Travel Time	-0.03	-0.02	-0.02
Walking Time	-0.02	<b>-0.11</b>	-0.04
Transfers time	-	-	-0.04
Transfers (n)	-	-	-0.14
Season Tickets	-	-	0.81
Log (Age)	-	-	0.50
Log(Income)	-	-	-0.39
Inertia	<b>0.47</b>	-	<b>1.09</b>
Parking cost	-0.06	-0.03	-
Car Always	0.31	-	-
PT to station	-	<b>-0.13</b>	-
Constant	0.02	-	1.35

Observations: **4350**

Adj. r2: **0.275**

# Trade-offs: Car-sharing

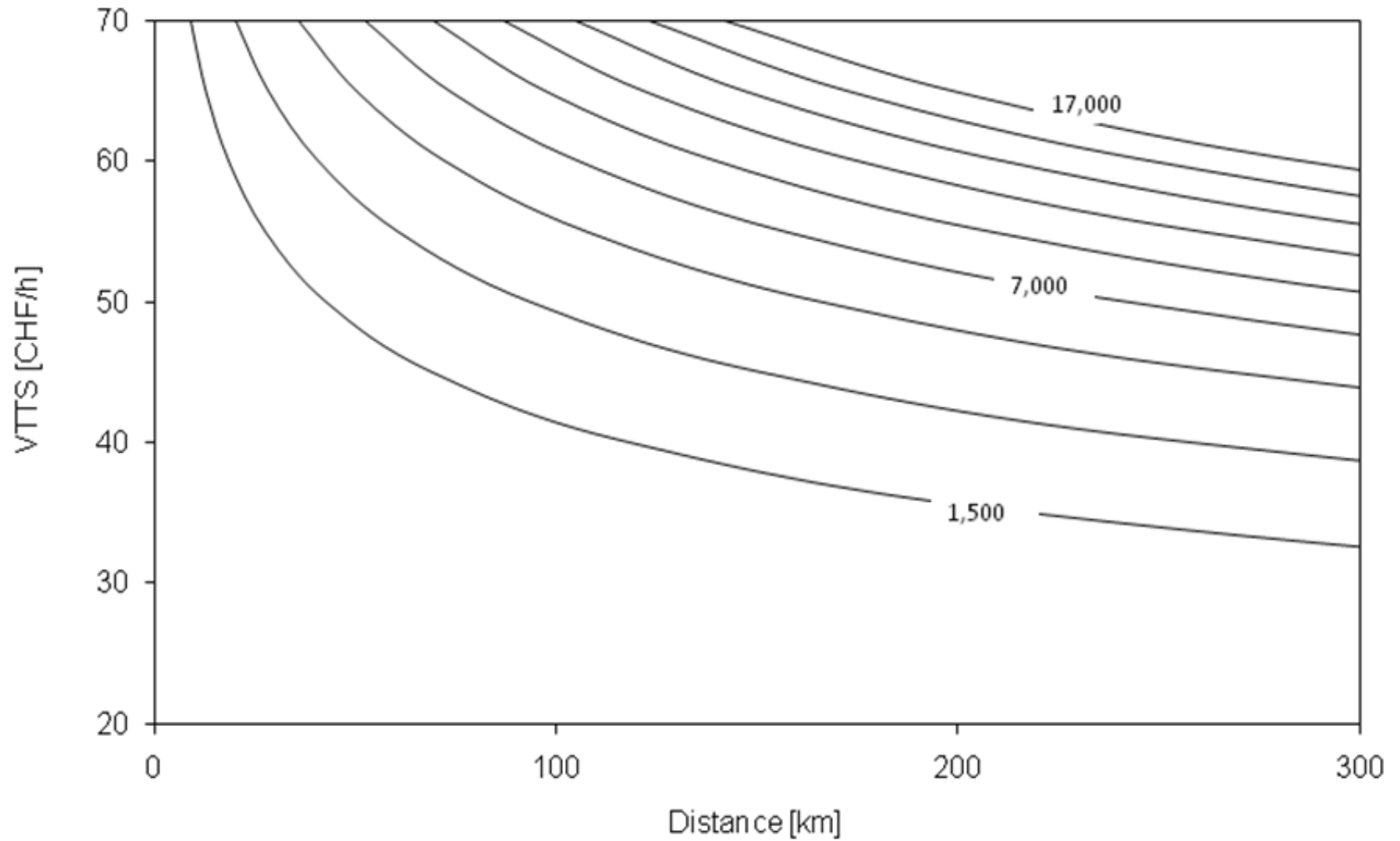
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Indicator	Unit	Value
VTTS Car	CHF/h	151.6
VTTS CS	CHF/h	68.6
VTTS PT	CHF/h	38.2
WTP PT Transfer Time	CHF/h	67.4
WTP PT Transfers (#)	CHF /Transfer	4.2
WTP Walk Car	CHF /h	88.1
WTP Walk PT	CHF /h	66.0
WTP Walk CS	CHF /min	321.0
WTP PT Time to Station CS	CHF /min	390.0

Average Income = 8300 CHF/Month

Average Trip Distance = 38.1 Km

# Interactions distance-income on VTTS - Carsharing





# Conclusions

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- Overall, the existence of a good unexploited potential for carpooling in Switzerland is suggested.
- Carpooling alternatives have a higher VTTS than car, suggesting that higher income persons prefer carpooling. This was not expected and this probably means that the choice to carpool is not only of economic nature, but other motivations – environmental, social, etc. – also play an important role.
- Potential carpoolers prefer to be passenger rather than drivers. Carpool as passenger is a more attractive option, being comfortable and comparatively cheap.
- The choice of carsharing seems prevalently economically driven. This is consistent with the fact that carsharing is a well known and diffused option in Switzerland

# Remarks

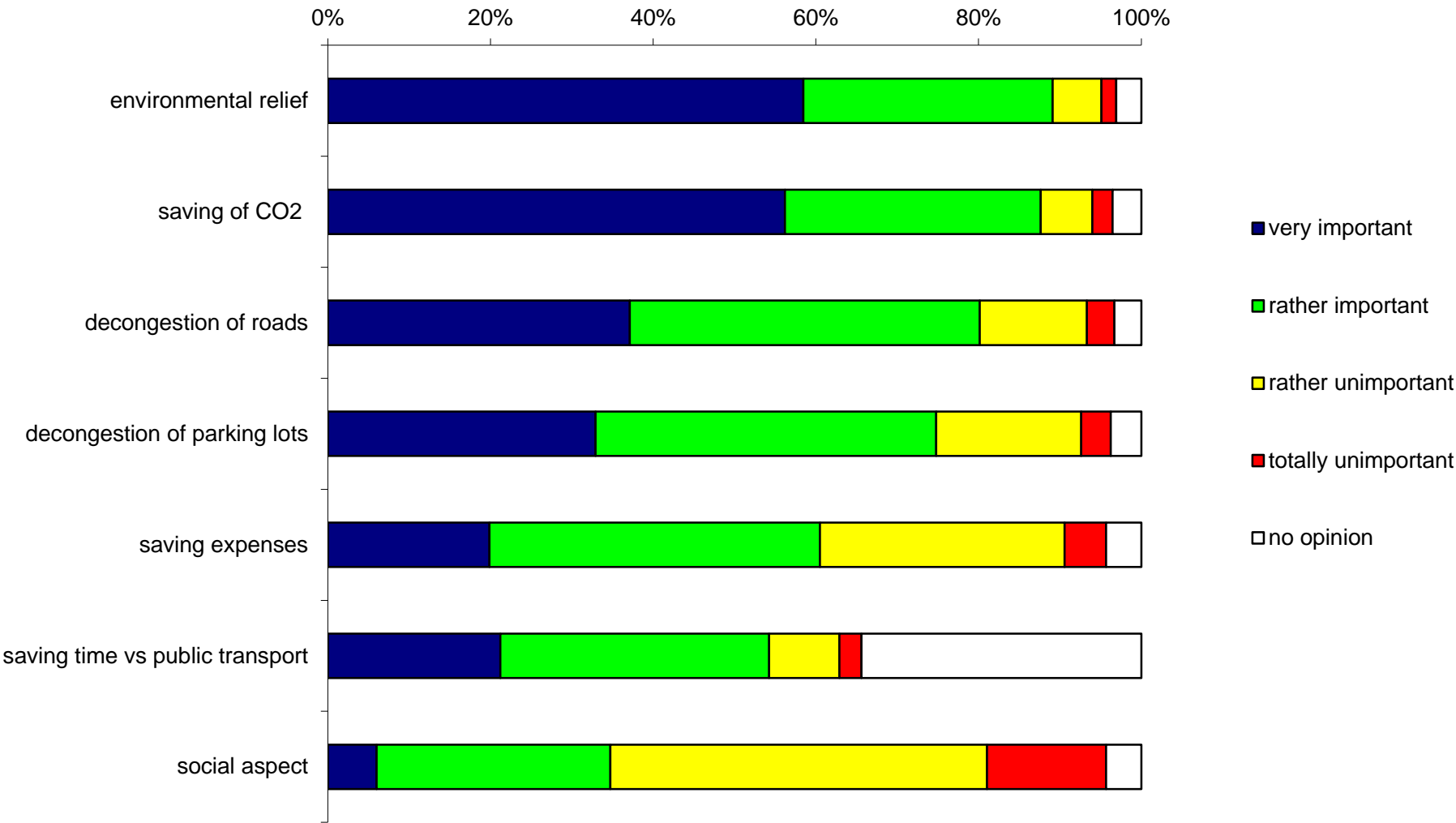
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- Is carpooling performing too well in the model?
- Possible reasons are:
  - Sample bias
  - Reflects some assumptions on carpooling which might be unrealistic for some potential participants (temporal deviation, available matches, etc.)
  - SP sometimes closer to self-representation than to reality
  - Learning process?

# Questions ?

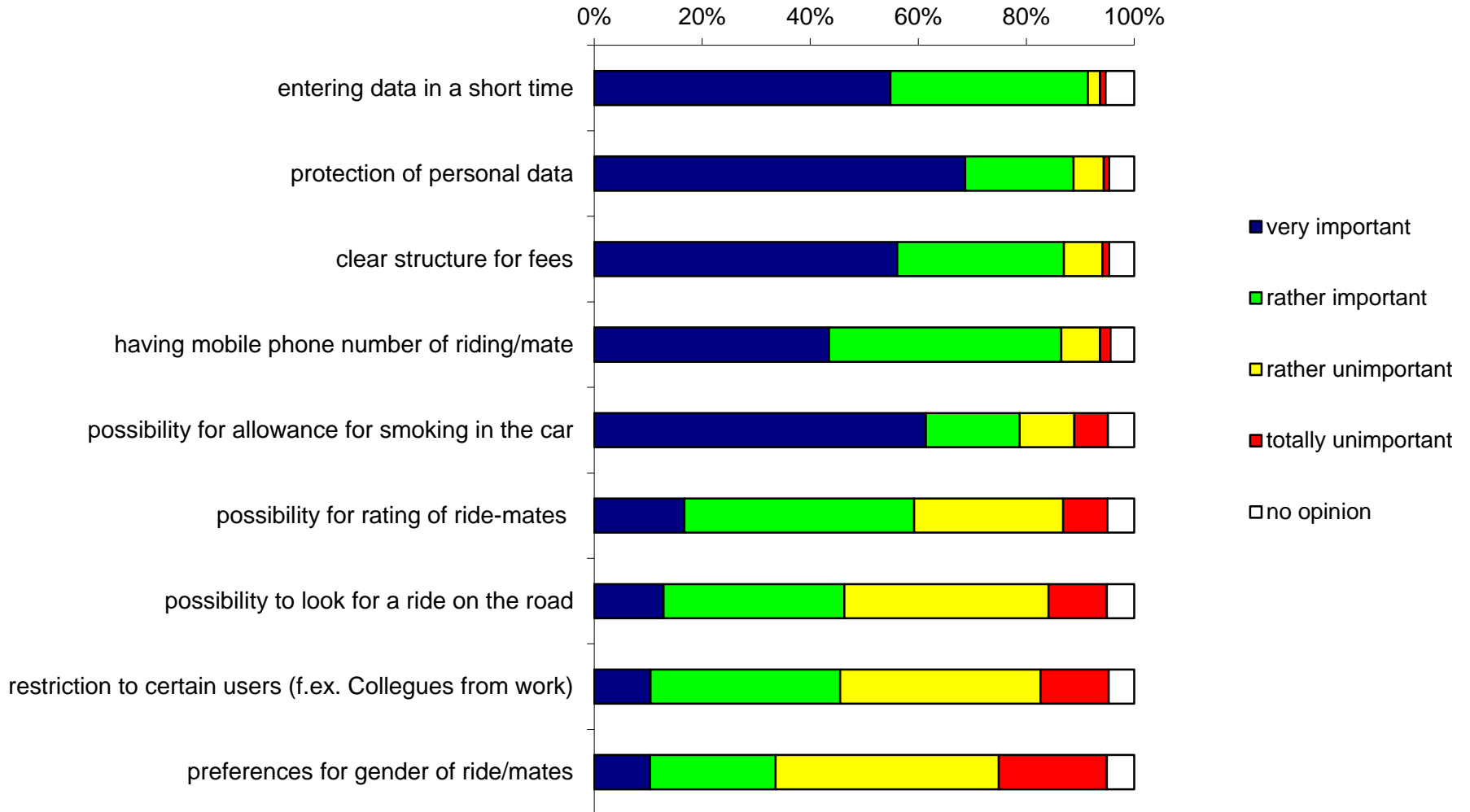
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# What motivate potential carpoolers?

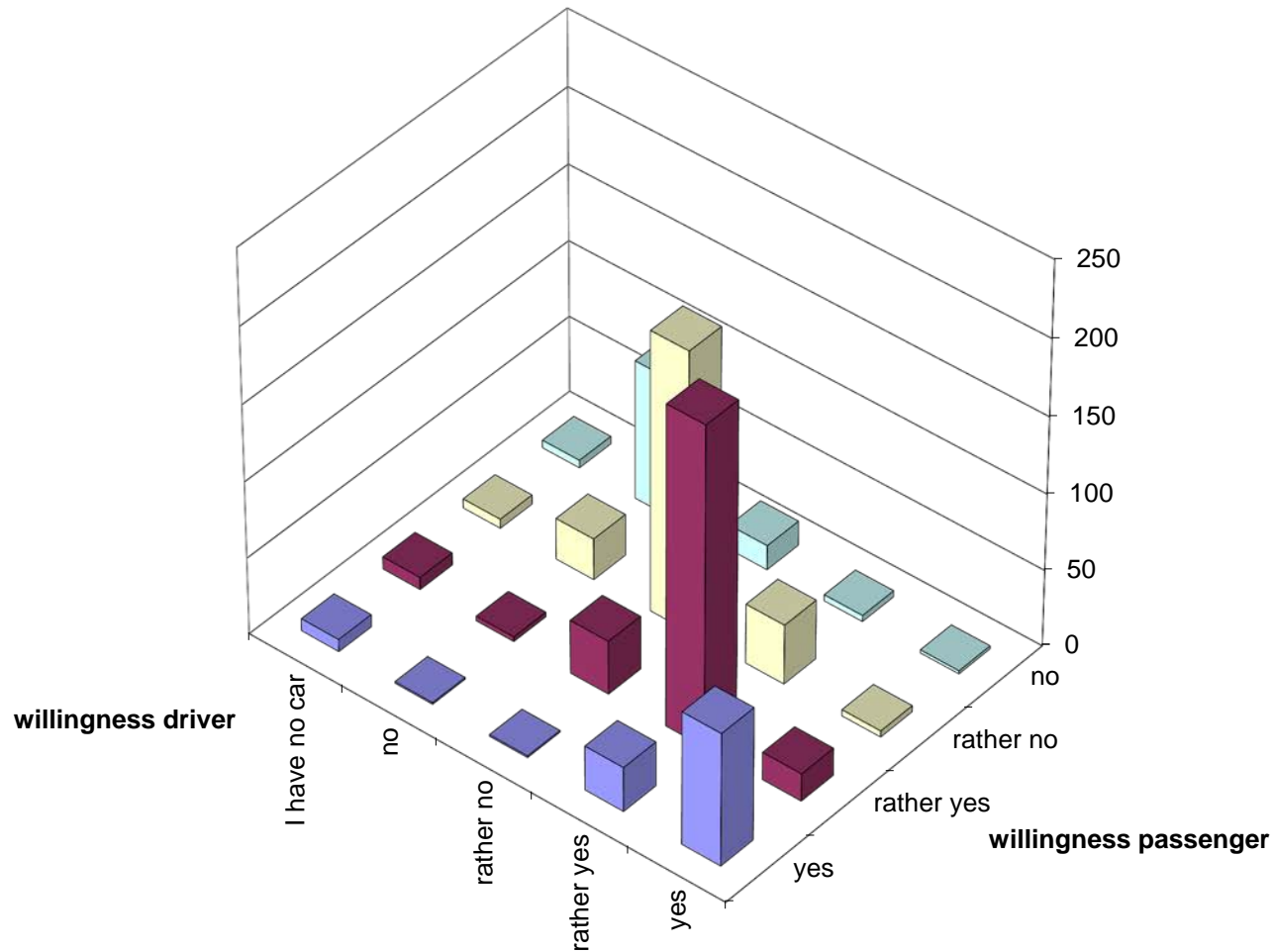


# How should be a Carpooling platform?

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# Correlation willingness to be a driver/passenger



# Summary (II)

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- Positive Attitude: 76% Positive
- Readiness to participate: 51% would participate
- Most important characteristics of the trip-mate: Driving style, Smoker, Appearance/Demeanor
- Basis for sharing the costs: Gasoline cost (70%)
- Maximal deviation for the Driver: up to 10 Minutes (83%)
- Barriers: Time adjustments, Fixed working time, Risk not being picked up
- Preferred incentives: Back-to-home guarantee, Pooling Platform, Financial incentives

# Continuous Interactions

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Continuous interactions between tastes and socio-demographic attributes, in this case trip distance and income, are an alternative to the use of arbitrary segmentations into different income and distance classes. The interactions are assumed as follows:

$$f(y,x) = b_x (y/y^*)^{l(y,x)} x$$

where  $y$  is the observed value for a given socio-demographic variable, and  $y^*$  is a reference value, usually the mean value across a sample population.