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Institute for Transport Planning and Systems

The impact of employer fringe benefits on commuting to work by car in Switzerland

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Mobility-related fringe benefits

Company cars

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Free parking

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PT subscription discounts

"Metro SmarTrip Card" by Mr.TinDC is licensed with CC BY 2.0.

Mobility-related fringe benefits in Switzerland

In 2010, Swiss employers offered the following mobility-related fringe benefits (BFS, 2010):

- 56% offered a car for private use to some of their employees
- 58% offered parking
- 10% offered a railway season ticket subscription

These benefits influence:

- mobility tool ownership
- mode choice behavior

Research goal

In Switzerland:

- the impacts of fringe benefits are still unclear
- the raw BFS data are no longer available
- no further detailed surveys have been conducted ever since

To fill this gap, we :

- conduct a large-scale online survey on mobility-related fringe benefits in Switzerland
- analyze how these influence the mode share for work commute trips

Outline

1. Data
2. Descriptive analysis
3. Model
4. Conclusion

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MOBIS study

MOBIS study (Molloy *et al.*, 2021a):

- large-scale RCT of transport pricing in Switzerland
- between September 2019 and January 2020
- over 3,500 participants
- mobility behavior recorded using tracking app
- participation criteria:
  - use a car at least two days a week
  - aged between 18 and 65
  - live within the German- or French-speaking regions of Switzerland

MOBIS:COVID-19 study (Molloy *et al.*, 2021b):

- understand the impacts of the pandemic on mobility in Switzerland
- from March 2020 until now
- over 800 still participating
- November 2020, new participants were recruited via LINK:
  - no requirements on car usage

All participants completed introductory surveys: socio-demographics and mobility tool ownership

Fringe benefits survey

Survey sent to:

- 1,259 participants
- 635 responses: 444 MOBIS and 191 LINK

Survey contents:

- employment situation (workload, sector, location)
- work commuting behavior (days a week per mode)
- mobility-related fringe benefits offered by employer
- cost of the benefits for employee
- whether they used the benefit

All questions refer to autumn 2019
Data enriched, filtered and weighted

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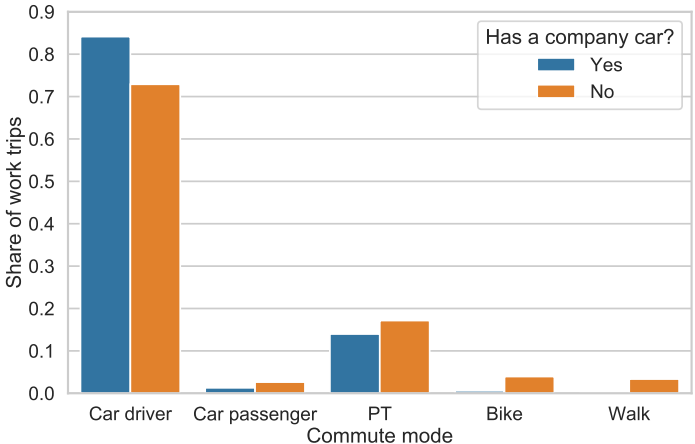
Effect of having a company car on the share of work trips per mode

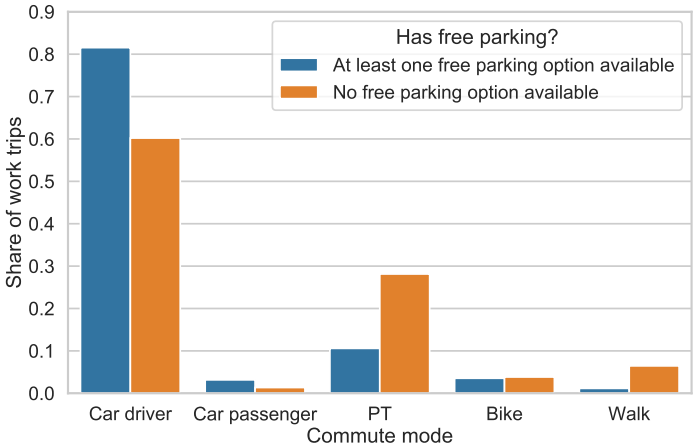
- 10% of commuters are offered a company car (83% make use of it)



11% increase (p-value < 0.001 with two-sided t-test)

Effect of free parking availability on the share of work trips per mode

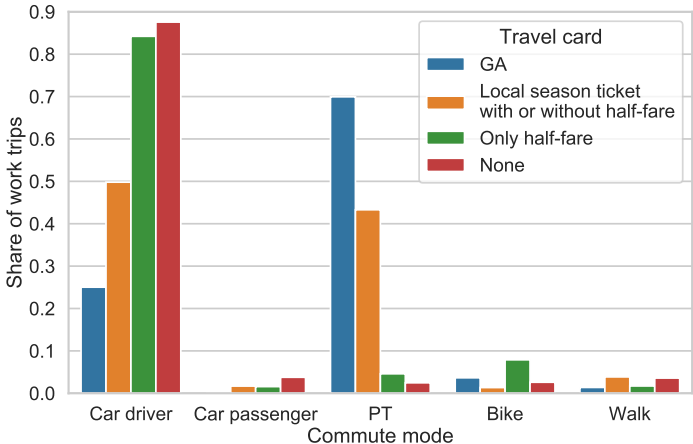
- 64% have at least one free parking option (83% offered by employer)



21% increase (p-value < 0.001 with two-sided t-test)

Effect of PT travel card on the share of work trips per mode

- 19% offered PT discount (7% GA, 12% half-fare, 6% other)



- GA: -62% (p-value < 0.001)
- Local season ticket: -38% (p-value < 0.001)
- Half-fare card: -3% (p-value < 0.1)

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Model formulation

Multivariate logistic regression model

$$\log\left(\frac{p}{1-p}\right) = \beta_0 + \beta_{male}x_{male} + \beta_{age}x_{age} + \beta_{income}x_{income} + \beta_{pt\_qual}x_{pt\_qual\_hh}x_{pt\_qual\_work}$$
$$+ \beta_{rel\_tt}x_{rel\_tt} + \beta_{firm\_car}x_{firm\_car} + \beta_{shower}x_{bike}x_{shower}$$
$$+ \beta_{pt\_subs}x_{pt\_subs} + \beta_{free\_parking}x_{free\_parking}$$

Model results

Parameter	Value	Std. Err.	p-value	
β_0	1.7757	0.6977	0.0109	*
β_{male}	-0.5629	0.2778	0.0427	*
β_{age}	-0.0063	0.0113	0.5788	
β_{income}	-0.0001	0.0001	0.0752	*
β_{pt_qual}	-0.5071	0.5352	0.3434	
β_{rel_tt}	0.6342	0.2253	0.0049	**
β_{firm_car}	0.7207	0.5976	0.2278	
$\beta_{free\_parking}$	0.9050	0.2732	0.0009	***
β_{pt_subs}	-1.6893	0.2779	0.0000	***
β_{shower}	-0.1452	0.2730	0.5946	
Note:	$^{***}p < 0.001$; $^{**}p < 0.01$; $^{*}p < 0.1$			

Full elasticities

Computation

$$\eta_{x,i} = \left(\frac{p_i(x = 1.01x_0) - p_i(x = x_0)}{p_i(x = x_0)} \right) \left(\frac{1}{0.01} \right)$$

$$\eta_x = \frac{\sum_i w_i \eta_{x,i}}{\sum_i w_i}$$

Results

Variable	Value
Age	-0.075
Scaled income	-0.136
Relative travel time difference	0.131

Semi-elasticities

Computation

$$\eta_{x,i} = \frac{p_i(x=1) - p_i(x=0)}{p_i(x=0)}$$

or

$$\eta_{x,i} = \frac{p_i(x=l) - p_i(x=None)}{p_i(x=None)}$$

then

$$\eta_x = \frac{\sum_i w_i \eta_{x,i}}{\sum_i w_i}$$

Results

Variable	Value
Male	-0.130
Public transport service quality at home	
A	-0.093
B	-0.070
C	-0.046
D	-0.023
Public transport service quality at work	
A	-0.061
B	-0.045
C	-0.030
D	-0.015
Company car	0.187
Shower available	-0.030
GA or local season ticket	-0.381
Free parking available	0.323

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Conclusion

In Switzerland:

- 10% of commuters are offered a company car
- 64% of commuters have at least one free parking option available
- 19% of commuters are offered some form of discounted PT travel card
- free parking & public transport subscription significant for commuting by car
  - free parking $\rightarrow$ 32.3%
  - GA or local season ticket $\rightarrow$ -38.1%

PT discounts instead of company cars and free parking $\rightarrow$ encourage other commute modes

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Thank you for your attention!
Questions?

STRC | **21th Swiss Transport Research Conference**
Monte Verità / Ascona, September 12 – 14, 2021

Company cars

Substantial share of European passenger vehicle fleet:

- 50% of new European car registrations (Naess-Schmidt and Winiarczyk, 2010)
- 12% of the total European passenger vehicle stock (Shiftan *et al.*, 2012)
- 10% of Dutch employees have a company car (Gutiérrez-i Puigarnau and Van Ommeren, 2011)

Car availability influences car usage

Annual mileage:
company cars > privately-owned cars (Metzler *et al.*, 2019)

Parking

In the US:

- 87% of employers offer free parking (Society for Human Resource Management, 2014)
- 95% of employees who drive to work have a free parking space available (Brueckner and Franco, 2018)

Parking subsidies encourage car use and urban sprawl (Brueckner and Franco, 2018)

Fewer employees drive to work when having to pay for parking (Willson and Shoup, 1990)

Data enriching, filtering and weighting

Enriching:

- Socio-demographics and mobility tool ownership
- Home and work location imputation
- Non-chosen alternatives for commute trip (Google Maps Directions API)

Filtering (404 participants):

- plausibility checks
- car or motorbike availability

Weighting against MTMC (BFS and ARE, 2017) using IPF:

- gender, age group, education level
- household income and size
- home and work location NUTS-2 division, municipality classification
- car, motorbike and bike ownership, PT subscription

Commuters who are offered a company car

- 10% of commuters are offered a company car
- 83% make use of the offer
- primarily offered to:
  - wealthier commuters
  - male
  - late 20s or their 40s
  - larger households
  - lower public transport service quality at work

Commuters who have free parking

- 64% of commuters have at least one free parking option available
  - 83% offered by employer
- 32% have only paid parking options available
- 4% do not have any parking option available

Commuters who have PT subscription discounts

	Travel card discount offered by employer		PT service quality Home	PT service quality Work	Household income (CHF/month)
GA	Yes (%)	6.88	0.40	0.68	9,200
	purchased via employer (rel. %)	66.87	0.48	0.70	9,200
	did not buy (rel. %)	33.13	0.25	0.62	9,400
	No (%)	93.12	0.45	0.63	7,900
	purchased on their own (rel. %)	2.56	0.33	0.90	9,600
	did not buy (rel. %)	97.44	0.45	0.63	7,900
Half-fare	Yes (%)	12.06	0.43	0.69	6,300
	purchased via employer (rel. %)	64.98	0.42	0.65	5,400
	did not buy (rel. %)	35.02	0.45	0.75	7,800
	No (%)	87.94	0.44	0.63	8,200
	purchased on their own (rel. %)	31.38	0.45	0.64	8,900
	did not buy (rel. %)	68.62	0.44	0.62	7,900
Other	Yes (%)	5.72	0.56	0.82	7,000
	purchased via employer (rel. %)	13.12	0.50	0.84	9,300
	purchased on their own (rel. %)	21.56	0.65	0.85	11,200
	did not buy (rel. %)	65.32	0.54	0.80	5,200
	No (%)	94.28	0.44	0.63	8,100
	purchased on their own (rel. %)	23.25	0.52	0.80	9,100
	did not buy (rel. %)	76.75	0.41	0.57	7,800
Sample average			0.44	0.64	8,000

Car %, PT %, weight per PT quality level

PT quality at home	PT quality at work									
	A (138.8)		B (78.5)		C (82.8)		D (72.2)		None (31.7)	
A	29.6	28.7	85.8	8.5	92.4	0.8	94.6	1.7	100.0	0.0
(42.8)		(14.0)		(6.9)		(5.4)		(11.2)		(5.3)
B	55.1	35.1	48.0	31.0	88.9	7.4	93.2	1.3	99.5	0.0
(92.5)		(18.4)		(28.1)		(30.9)		(8.8)		(6.3)
C	71.5	23.0	53.6	40.9	65.8	26.2	80.9	11.5	88.7	0.0
(76.6)		(34.5)		(11.7)		(19.0)		(8.9)		(2.5)
D	70.6	28.1	74.1	15.0	99.3	0.0	74.0	0.0	85.2	0.0
(113.3)		(49.6)		(18.3)		(16.7)		(11.4)		(17.3)
None	62.5	30.5	100.0	0.0	50.7	47.6	77.7	0.0	100.0	0.0
(78.8)		(22.3)		(13.5)		(10.8)		(31.9)		(0.3)