

# Bevorzugter Zitierstil

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Axhausen, K.W. (2011) Recent Swiss stated-adaptation experiments: Surveys methods and some results, Centre for the Study of Choice Seminar, University of Technology Sydney, May 2011.

# Recent Swiss stated-adaptation experiments: Surveys methods and some results

KW Axhausen

IVT

ETH

Zürich

May 2011

**FUTURE CITIES  
LABORATORY**

 *Institut für Verkehrsplanung und Transportsysteme  
Institute for Transport Planning and Systems*

**ETH**

Eidgenössische Technische Hochschule Zürich  
Swiss Federal Institute of Technology Zurich

# Acknowledgements

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## Researchers:

- Alexander Erath
- Boris Jäggi
- Claude Weis

## Sponsors:

- bafu & BFE
- SNF
- (ASTRA SBT – funded) SVI research

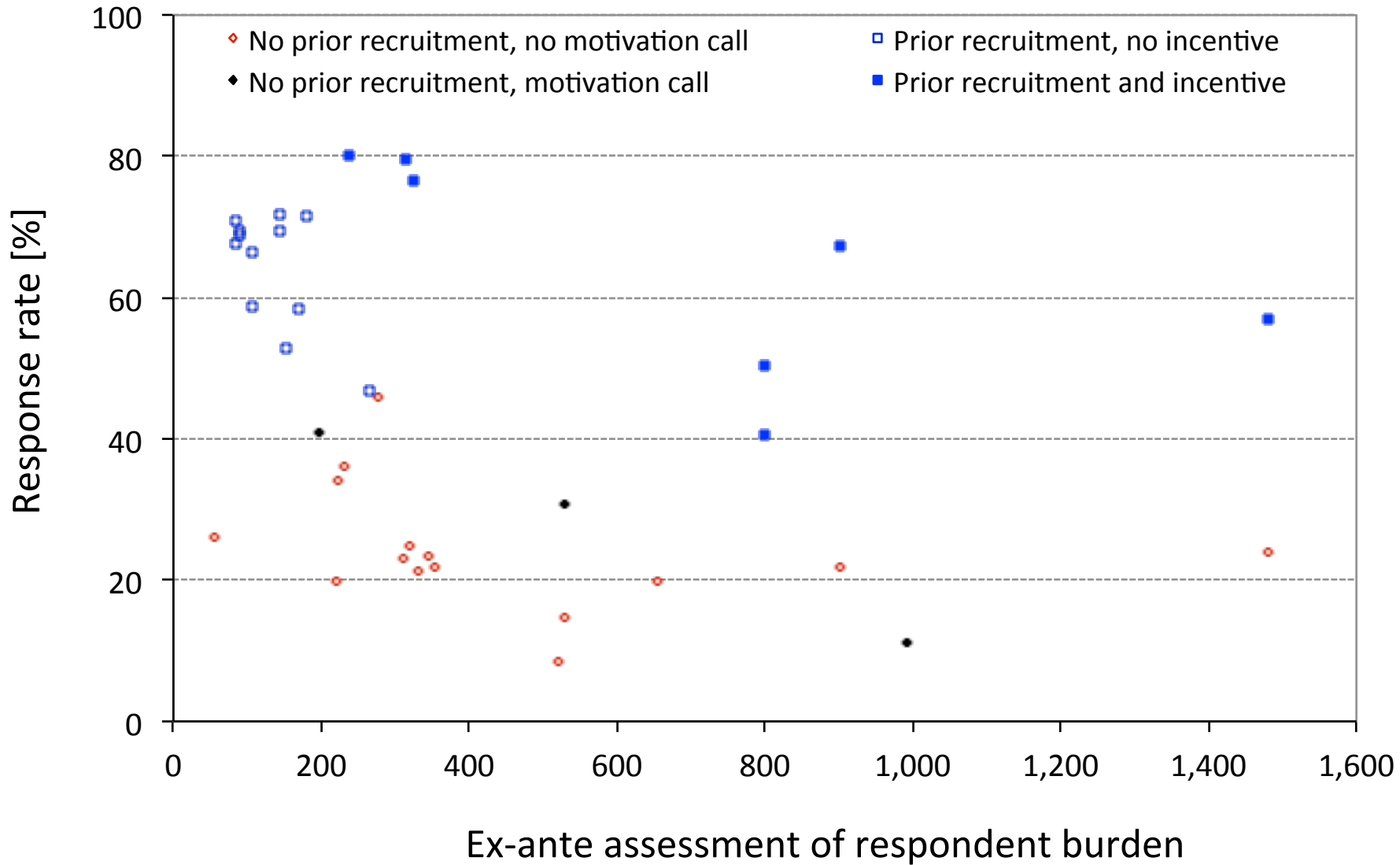
# Acknowledgements

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Econometric software:

- Michel Bierlaire
- Chandra Bhat
- Abdul Pinjari

# Field work experience @ IVT



# Mobility tool ownership (and residential choice)

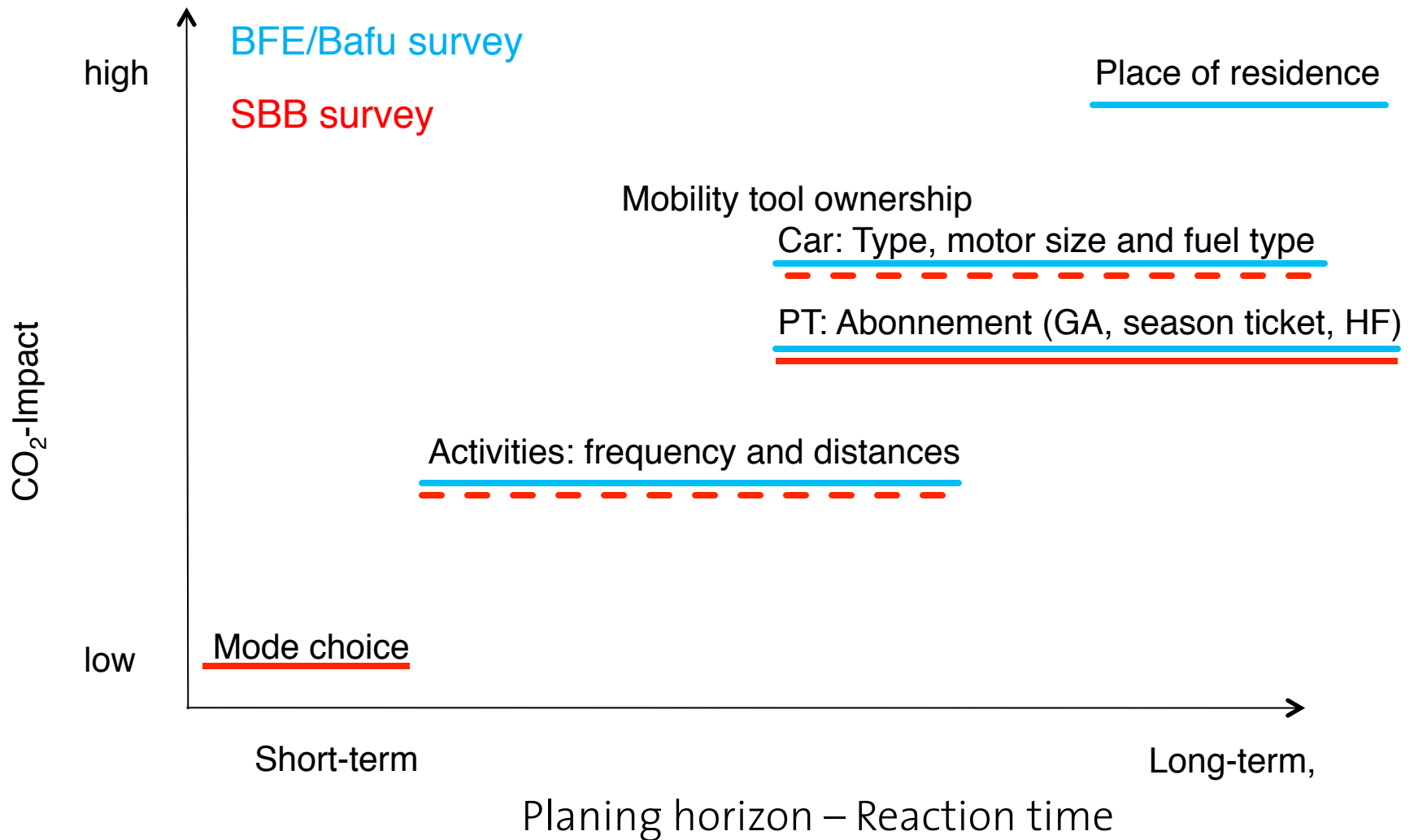
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# Motivation: Fuel price spike in 2008

Data: U.S. Energy Information Administration, May 2011



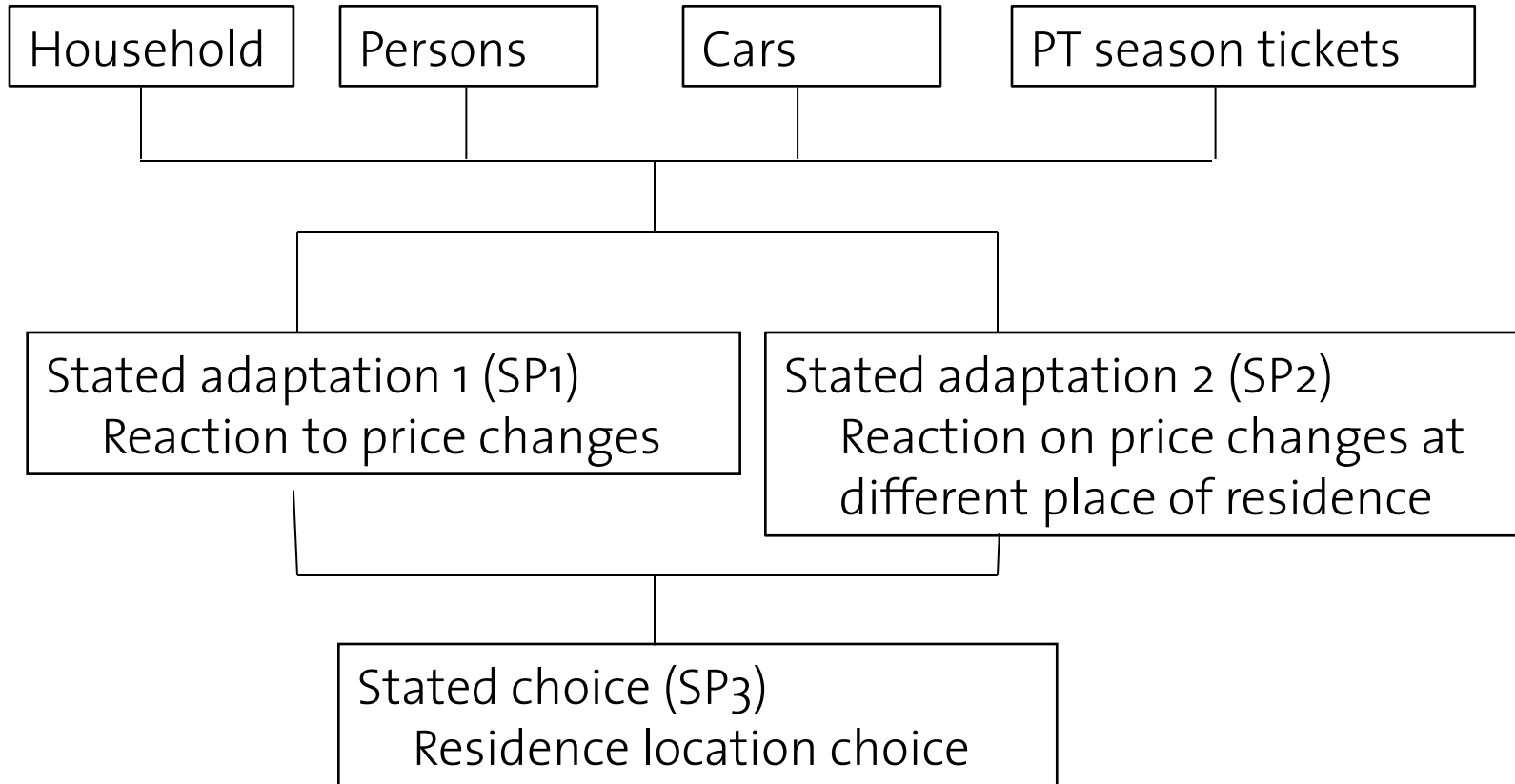
# Possible reactions to higher fuel prices





# Survey: Overview

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# SP1: First stated adaption experiment

JFrame

A: Name und Wohnort | B: Wohnsituation | C: verkehrliche Lage der Wohnung | D: Personenwagen im Haushalt | E: Personen im Haushalt | F: Monats

Szenario 1 | Szenario 2 | Szenario 3 | Szenario 4 | Szenario 5 | Szenario 6

Kosten Treibstoff [CHF/l]	1.5
Typ CO2-Bonus/Malus	<b>Einmalzahlung für Energieeffizienzklasse A</b>
CO2-Bonus/Malus pro Monat	<b>Bei Neukauf: -1500 CHF</b>
Preise ÖV relativ zu heute	<b>-10%</b>
Wohnlage	<b>Innenstadt</b>

	IV bisher	ÖV bisher
Reisezeit zur Arbeit [min]	-	-
Reisezeit nächstes Zentrum [min]	-	-

Total Wohnkosten	1183.00
Veränderung Wohnkosten	-17.00

Fahrzeug 1

Wahl PW	Mittelklasse
Wahl Hubraum	1500-2000ccm
Typ Motor	Benzin
Neuwagen	<input type="checkbox"/>
Jahresfahrleistung	10000.00
Jahresfahrleistung bisher	12000.00

Verbrauch / 100km	7.70
Energiekategorie	A
CO2-Anreiz/Malus	0,00

Fahrzeug Kosten/Monat	644.20
Veränderung Fahrzeugkosten	-40.25

Fahrzeug hinzufügen | Fahrzeug entfernen

Fahrzeuge übernehmen

Wahl ÖV-Abo	Person 1
Abotyp	Halbtax
Jahresfahrleistung	1500.00
Jahresfahrleistung bisher	1500.00

ÖV Kosten/Monat	48.75
Veränderung ÖV-Kosten	0.00

Person hinzufügen | Person entfernen

Personen übernehmen

Total Ausgaben	1924.70
Veränderung Ausgaben	-8.50

# SP1: First stated adaption experiment

JFrame

A: Name und Wohnort | B: Wohnsituation | C: verkehrliche Lage der Wohnung | D: Personenwagen im Haushalt | E: Personen im Haushalt | F: Monatslohn

Szenario 1 | Szenario 2 | Szenario 3 | Szenario 4 | Szenario 5 | Szenario 6

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Reisezeit nächstes Zentrum [min]	-	-

Total Wohnkosten	1183.00
Veränderung Wohnkosten	-17.00

Fahrzeug 1

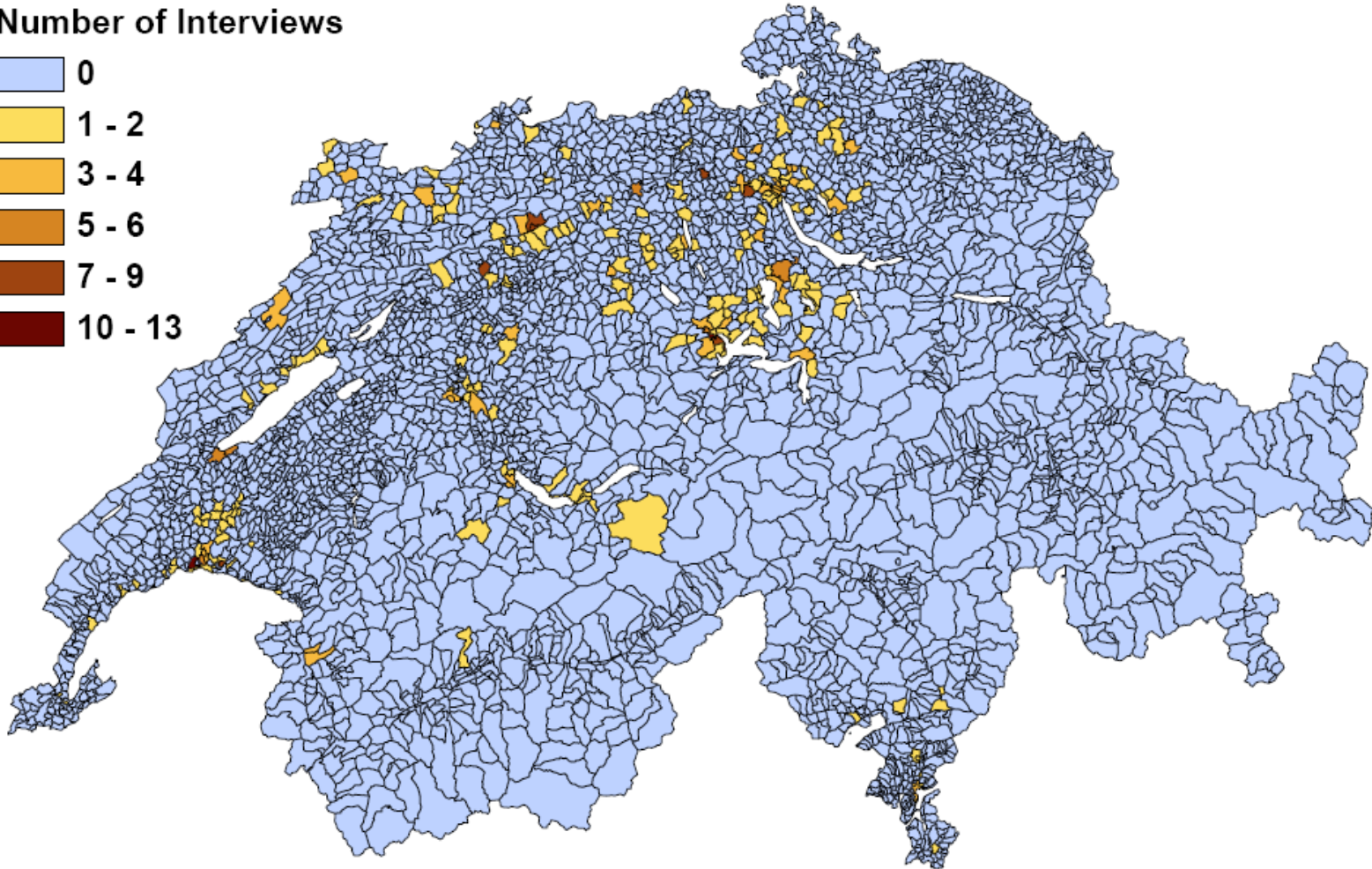
Wahl PW	Mittelklasse	▼
Wahl Hubraum	1500-2000ccm	▼
Typ Motor	Benzin	▼
Neuwagen	<input type="checkbox"/>	
Jahresfahrleistung	10000.00	
Jahresfahrleistung bisher	12000.00	

# SP1: First stated adaption experiment

Verbrauch / 100km	7.70
Energiekategorie	A
CO2-Anreiz/Malus	0,00
Fahrzeug Kosten/Monat	644.20
Veränderung Fahrzeugkosten	-40.25
<input type="button" value="Fahrzeug hinzufügen"/>	<input type="button" value="Fahrzeug entfernen"/>
<input type="button" value="Fahrzeuge übernehmen"/>	
Wahl ÖV-Abo	Person 1
Abotyp	Halbtax <input type="button" value="▼"/>
Jahresfahrleistung	1500.00
Jahresfahrleistung bisher	1500.00
ÖV Kosten/Monat	48.75
Veränderung ÖV-Kosten	0.00
<input type="button" value="Person hinzufügen"/>	<input type="button" value="Person entfernen"/>
<input type="button" value="Personen übernehmen"/>	
Total Ausgaben	1924.70
Veränderung Ausgaben	-8.50

# Field work: 409 face-to-face interviews - 25 sFr incentive

Number of Interviews



0 15 30 60 90 120 Kilometers

# Field work: Representativeness

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Overrepresented:

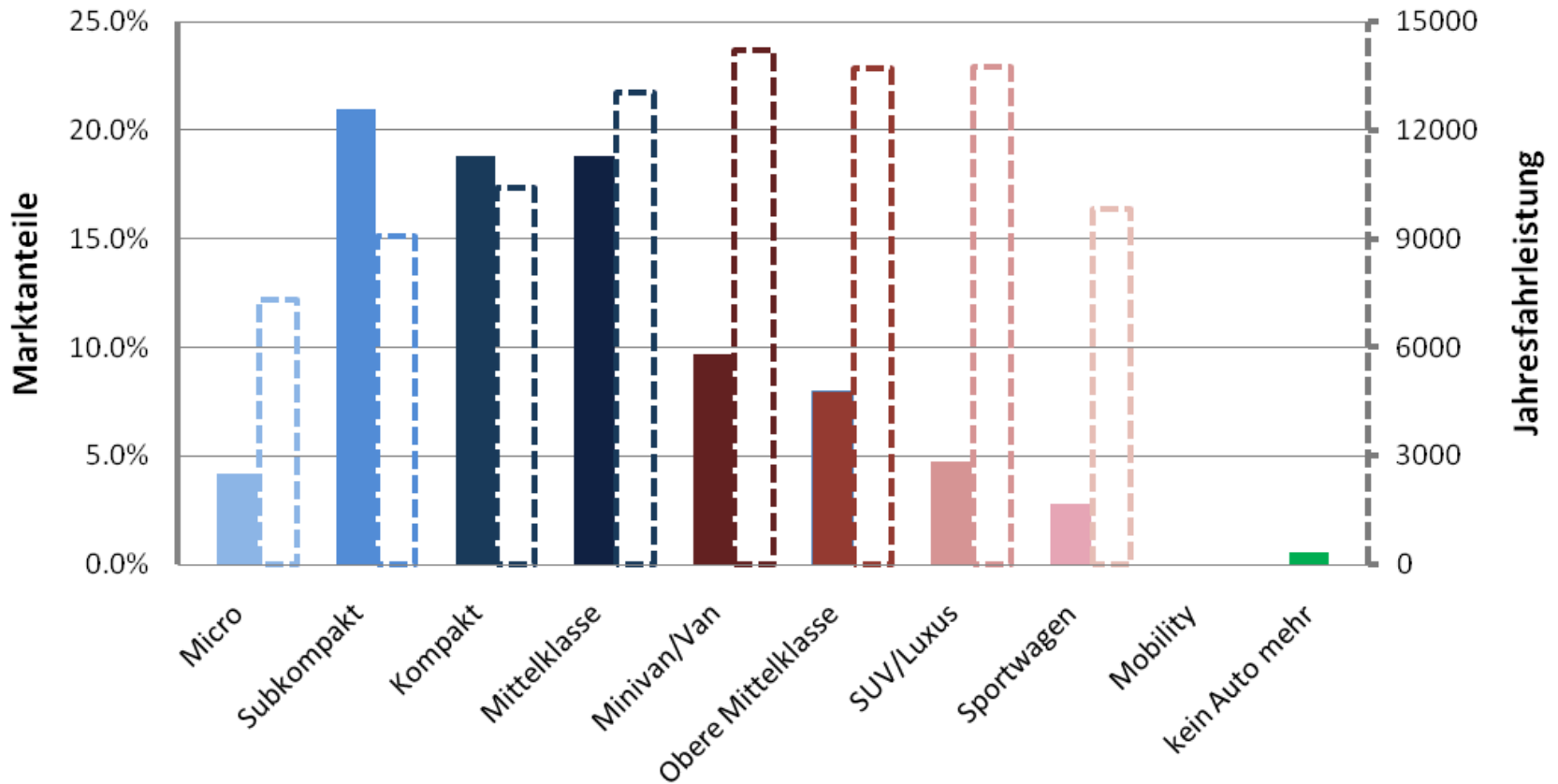
- 1 person households
- 1 car in the household

Underrepresented:

- Half-fare discount card
- National season ticket (GA)

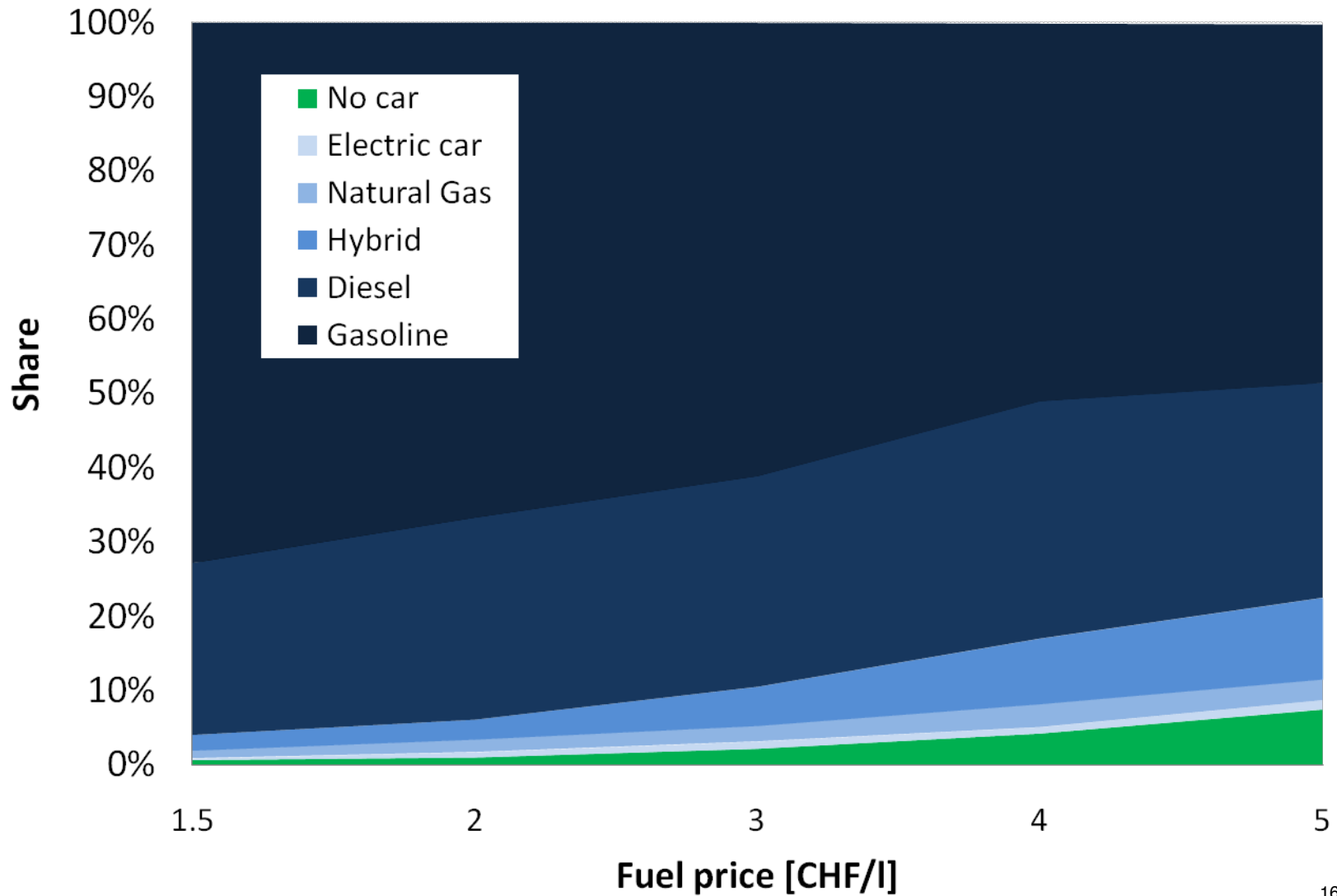
# Descriptive Analysis I

Treibstoffpreis 1.5 CHF



# Descriptive Analysis II

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# Multiple Discrete-Continuous Extreme Value Model

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$$U(x) = \sum_{k=1}^K \gamma_k \Psi_k \ln\left(\frac{x_k}{\gamma_k} + 1\right)$$

$$\Psi_k = e^{\sum \beta_i z_{i,k} + \varepsilon_k}$$

$\Psi_k$  : Baseline marginal utility of good k

$\gamma_k$  : Satiation parameter of good k

$x_k$  : Consumed quantity of good k

$\beta_i$  : Parameter attribute i

$z_{i,k}$  : Value of attribute i of good k

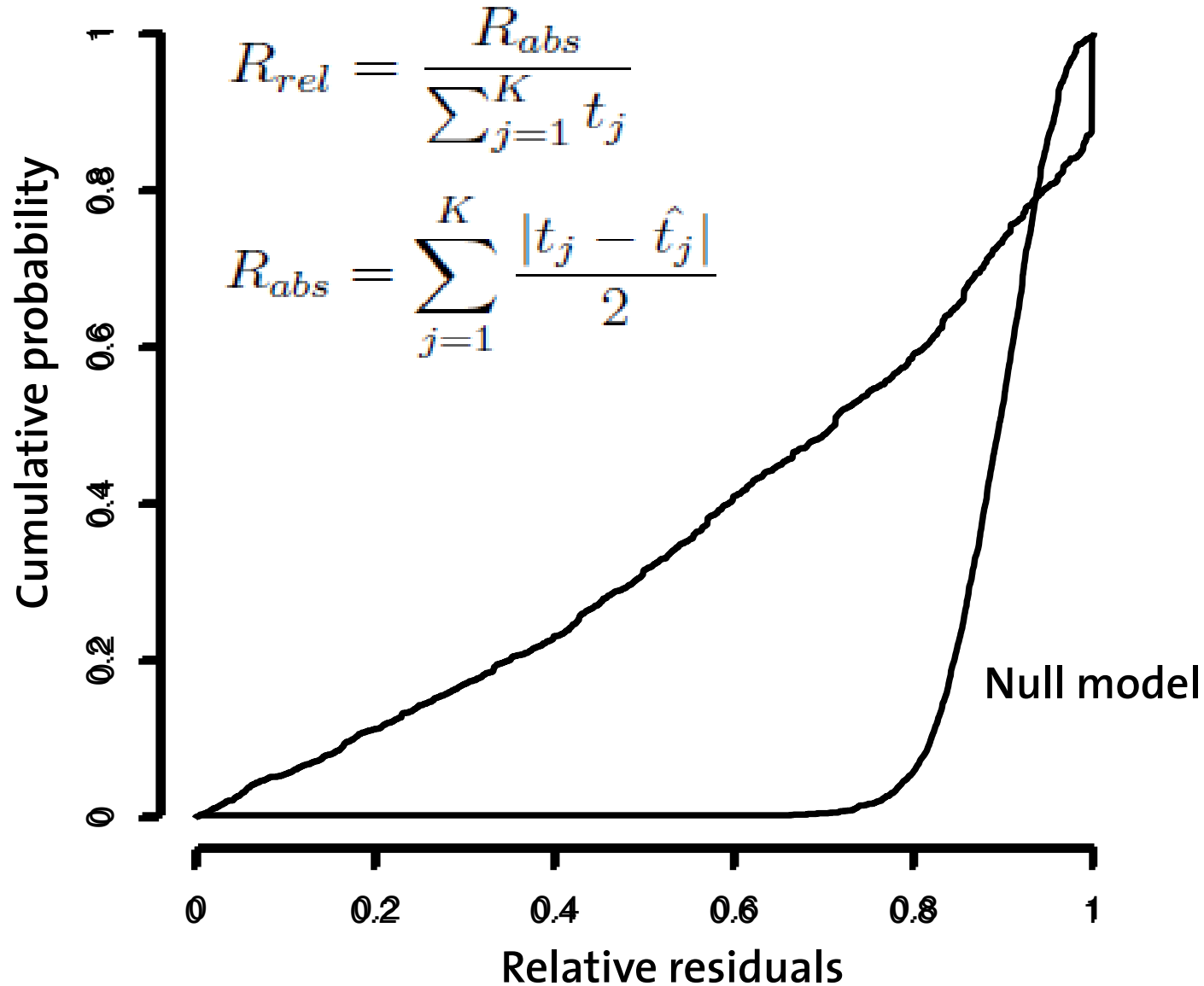
$\varepsilon_k$  : Gumbel error term of good k

# Hit ratio comparison

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Model	Alt.	Saturation	N	Hit Ratio [%]		
				Mean	< 5%	> 50%
Without PT	16	alpha	10	<b>39.6</b>	40.0	35.8
Without PT	16	alpha	50	<b>39.6</b>	39.0	37.8
Without PT	16	gamma	50	<b>36.8</b>	41.1	34.2
With PT	17	alpha	10	<b>25.3</b>	11.1	1.2
With PT	17	alpha	50	<b>25.3</b>	8.3	1.4
With PT	17	gamma	50	<b>55.3</b>	12.9	47.3
Ref. Model			50	<b>8.7</b>	14.3	0.0

# Residuals: Best versus Null-model

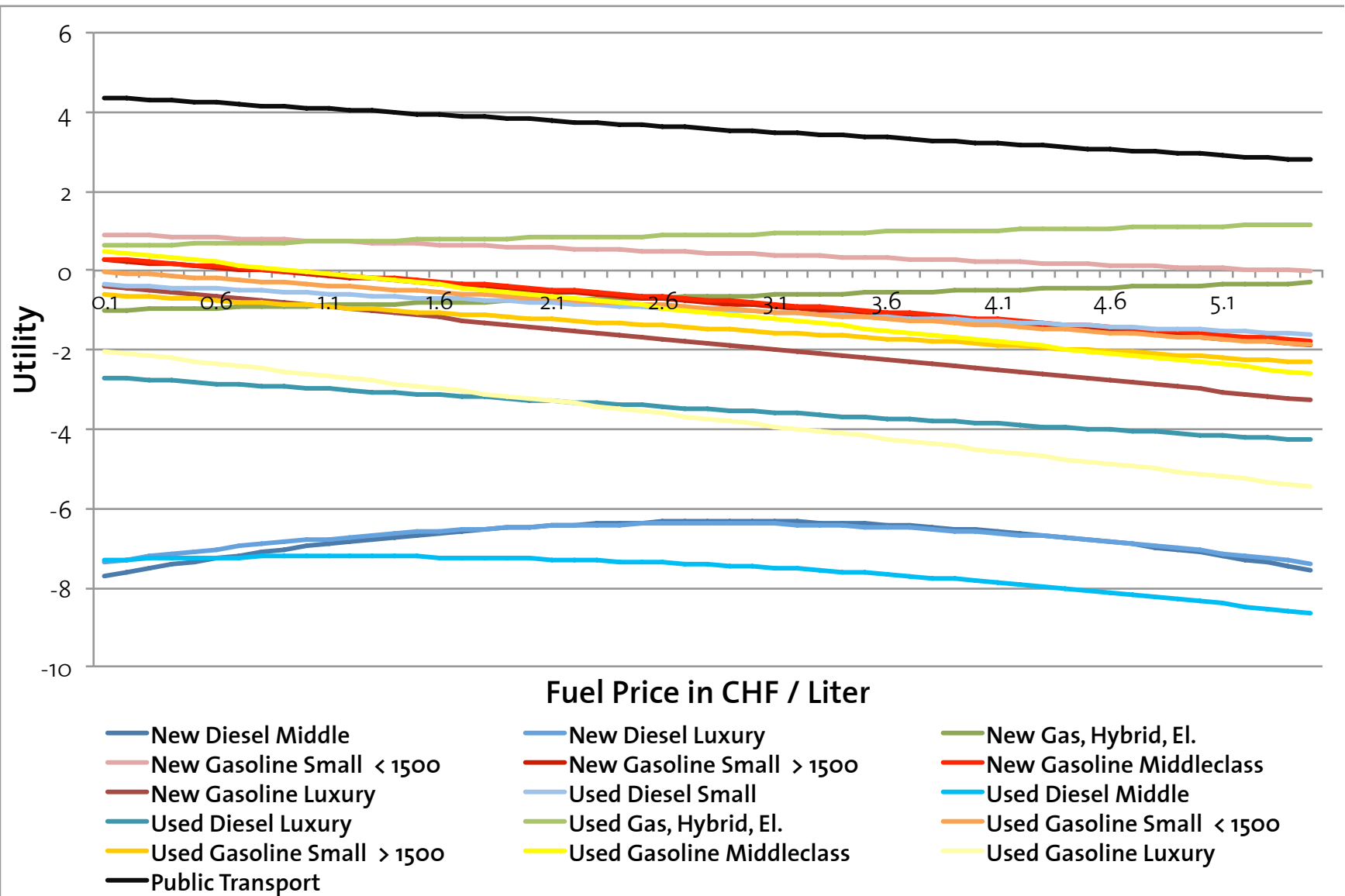


# MDCEV parameters: ; $\rho^2 = 0.46$

$$\gamma_j = \exp(\theta_C + \theta_I \cdot \text{Income} + \theta_F \cdot \text{Fuelprice})$$

	In- come	Fuel	Fuel <sup>2</sup>	Dist to Work	Accessa- bility F1	Accessa- bility F2	Theta const	Theta In-come	Theta Fuel price
D (small)							2.60	-0.14	0.18
D (middle)	0.02	1.03	-0.18	0.52			18.19	-0.08	-3.29
D (lux)	0.02	0.75	-0.14	0.24			1.02	0.09	-0.11
Hybrid	-0.03	0.13		0.42	0.01	-0.01	0.64	2.61	1.69
G (v. small)	-0.06	-0.17		0.44			1.42	-0.13	0.04
G (small)	0.02	-0.40		0.57			1.44	-0.08	-0.02
G (middle)	0.01	-0.38		0.29			2.74	-0.15	-0.08
G (lux)	0.00	-0.53		0.63			1.46	-0.04	-0.24
uD (small)	-0.05	-0.23		0.67			5.28	-0.35	0.04
uD (middle)	0.14	0.18	-0.08	1.28			2.00	-0.08	-0.01
uD (lux)	0.17	-0.29		1.58			1.07	-0.01	0.16
u Hybrid	-0.03	0.10		1.01	0.01	-0.01	0.38	1.95	1.43
uG (v. small)	-0.02	-0.34		1.31			1.69	-0.11	-0.05
uG (small)	0.02	-0.32		1.57			5.06	-0.28	-0.19
uG (middle)	0.07	-0.57		1.23			0.89	2.42	1.76
uG (lux)	0.09	-0.63		1.04			2.19	-0.19	0.19
Transit	-0.06	-0.29		1.02	0.01	-0.01	-4.14	0.09	0.06

# Utilities by type and fuel price



# Conclusion: Mobility tool ownership and usage

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- Mobility tools
  - ++ Diesel
  - ++ smaller engines
  - + substitution effects with public transport
  - mileage
  - number of cars
  - o rebound effects
- Elasticities
  - Differentiation between Diesel and gasoline
  - Depending on fuel price level
  - Comparable to the results of Baranzini *et al.* (2009)

# eHATS: Induced demand

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# Responses to change in generalised cost of travel

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- Whether or not to leave home
  - Number (and type) of out-of-home activities
  - Sequence of out-of-home-activities (trip chaining)
    - Durations of out-of-home-activities
    - Departure times
    - Destinations
      - Travel modes
      - Routes



## Part 1: Pseudo – panel 1974-2005 national diary surveys

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- *Structural Equations Models*
  - “persons” formed by age, sex, region
- Generalized costs captured as accessibilities

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Indicator	Elasticity w/r accessibility
Share of out-of-home	0.61
Number of trips	0.44
Time out-of-home	0.10

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# Survey protocol

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- Introduction letter
  - Project description
  - 20.- Swiss Francs incentive per participant!
- Recruitment call (a few days after the letter has been sent)
- Diary questionnaire (5 days; all adults in household)
  - Online
  - Pen-and-paper
- Face-to-face interview eHATS (after Jones, 1979) (based on day chosen from diary data)
  - Introduce changes (-50%, +50%, +100%, +200% to relevant trip of the day)
  - Adaptations to form new schedule

# Heuristics for choice of day and trip to be modified

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- Chosen day: day with most trips
- Trip:
  - Priority on mandatory trips (as these force stricter constraints on a schedule):
    - Work
    - Education
    - Accompanying children to school
  - If none of the above are available, look for shopping trips
  - If neither applies, choose the longest leisure trip

## Response

	Total	Online	Paper
Called	2'389		
Reached	1'344		
Recruited	340	140	200
Rate recruited [%]	25.3		
Diaries completed by all household members	158	57	101
Response rate [%]	46.5	40.7	50.5
Persons with 7 day-diary	226	96	130
Persons per household	1.43	1.68	1.29
eHATS household interviews conducted	141		
eHATS person interviews conducted	205		

# Online-diary

**Abmelden**

**Startseite**

Dateneingabe:

**Haushaltsdaten**

**Personenübersicht**

**Lokalitätenübersicht**

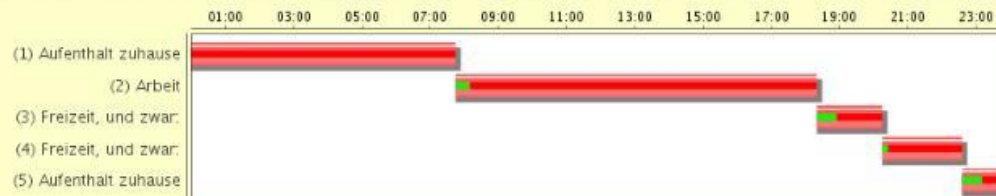
Tagebuch:

**Tag & Person**

Hier können, anschliessend an die Eingabe der Haushalts- und Personendaten, die einzelnen Personen Ihres Haushalts Ihre Aktivitätentagebücher anlegen.

Die 5 Tage, für welche Ihr Haushalt Tagebuch führen soll, sind im Voraus festgelegt. Um zu einem dieser Tage zu gelangen und mit der Eingaben zu beginnen, wählen Sie den entsprechenden Tag aus der Liste aus:

Tag  Person



Im folgenden sind die bereits eingegebenen Aktivitäten aufgelistet. Für jeden Tag ist eine Aktivität von vorneherein festgelegt. Diese beschreibt Ihren Aufenthalt zu Hause vor dem ersten zurückgelegten Weg und **sollte nicht verändert werden**. Vielmehr gelangen Sie zur Eingabemaske für Ihren ersten Weg, indem Sie auf "nächsten Weg eingeben" klicken:

Abfahrtszeit	Ankunftszeit	Ort	Tätigkeit	bearbeiten	entfernen	nächster Weg
00:00	00:00	Hauptwohnsitz	Aufenthalt zuhause	bearbeiten		nächsten Weg eingeben
07:45	08:10	ETH Hönggerberg	Arbeit	bearbeiten	entfernen	nächsten Weg eingeben
18:20	18:55	Restaurant La Côte	Abendessen	bearbeiten	entfernen	nächsten Weg eingeben

# eHATS: Interview-Software

## Einstellungen






Wed Mar 03 00:00:00 CET 2010

neuen Ort erstellen

Ausgangsszenario in Datei speichern

Eingaben in Datei speichern

## Claude

Legende					
Zeitaufteilung					
Tätigkeit	Aufenthalt zuhause	Arbeit	Freiz...	Freizeit,...	A...
Beschreibung der Tätigkeit	Ausgangsaktivität		Abendesse	Kino	
Ort der Tätigkeit	Hauptwohnsitz	ETH Hönggerberg	Rest...	Kino Ut...	H...
Abfahrtszeit	00:00	07:45	18:20	20:15	22:35
Zu Fuss	00:00	00:05	00:10	00:10	00:05
Fahrrad	00:00	00:00	00:00	00:00	00:00
Motorrad / Moped	00:00	00:00	00:00	00:00	00:00
Auto	00:00	00:00	00:00	00:00	00:00
Bus	00:00	00:10	00:10	00:00	00:00
Tram	00:00	00:05	00:10	00:00	00:25
Bahn	00:00	00:00	00:00	00:00	00:00
Flugzeug	00:00	00:00	00:00	00:00	00:00
Schiff	00:00	00:00	00:00	00:00	00:00
Andere	00:00	00:00	00:00	00:00	00:00
Wartezeit	00:00	00:05	00:05	00:00	00:05
Fahrzeit gesamt	00:00	00:25	00:35	00:10	00:35
Aktivitätsdauer	07:45	10:10	01:20	02:10	00:50
entfernen	entfernen	entfernen	entf...	entfer...	...

Neuen Weg & Aktivität einfügen

Alten Weg & Aktivität einfügen

# Sample bias in the response

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- Overrepresented:
  - Larger households
  - Higher incomes
  - Higher education
  - Public transport season tickets
  - Middle aged
- Underrepresented:
  - Car availability
  - Younger households

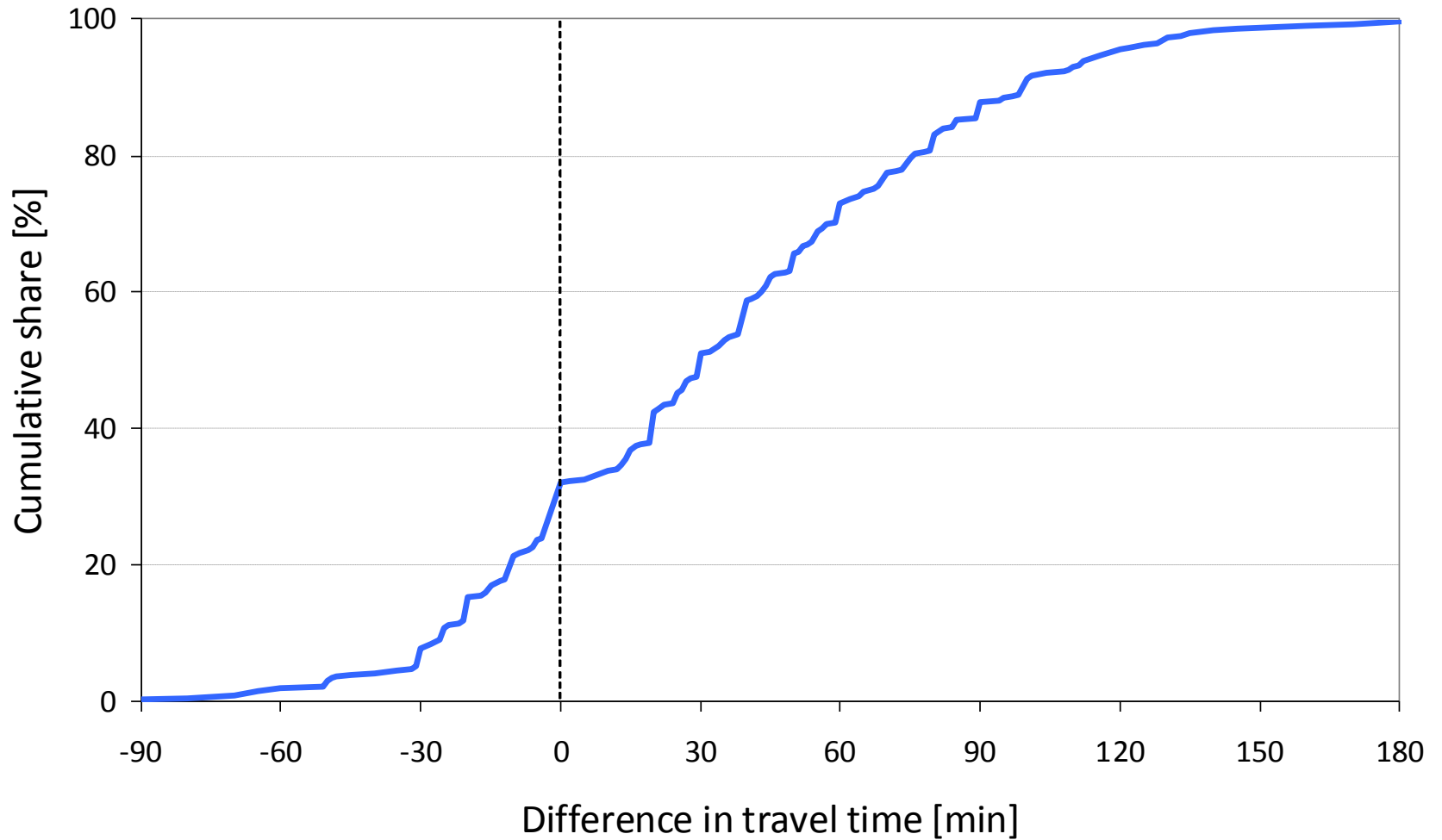
# Mobility indicators

Attribute	Web-diary	Paper-diary	MZ'05
<i>Monday-Friday</i>	n = 325	n = 500	
Share of mobiles[%]	87.7	91.6	91.0
Mean number of trips	3.53	3.11	3.67
Mean number of trips (mobiles)	4.02	3.55	4.03
<i>Saturday</i>	n = 75	n = 55	
Share of mobiles[%]	70.7	87.3	89.4
Mean number of trips	3.01	3.00	3.26
Mean number of trips (mobiles)	4.44	4.26	3.64
<i>Sunday</i>	n = 56	n = 44	
Share of mobiles[%]	60.7	72.7	79.3
Mean number of trips	1.93	1.95	2.11
Mean number of trips (mobiles)	3.18	2.69	2.66



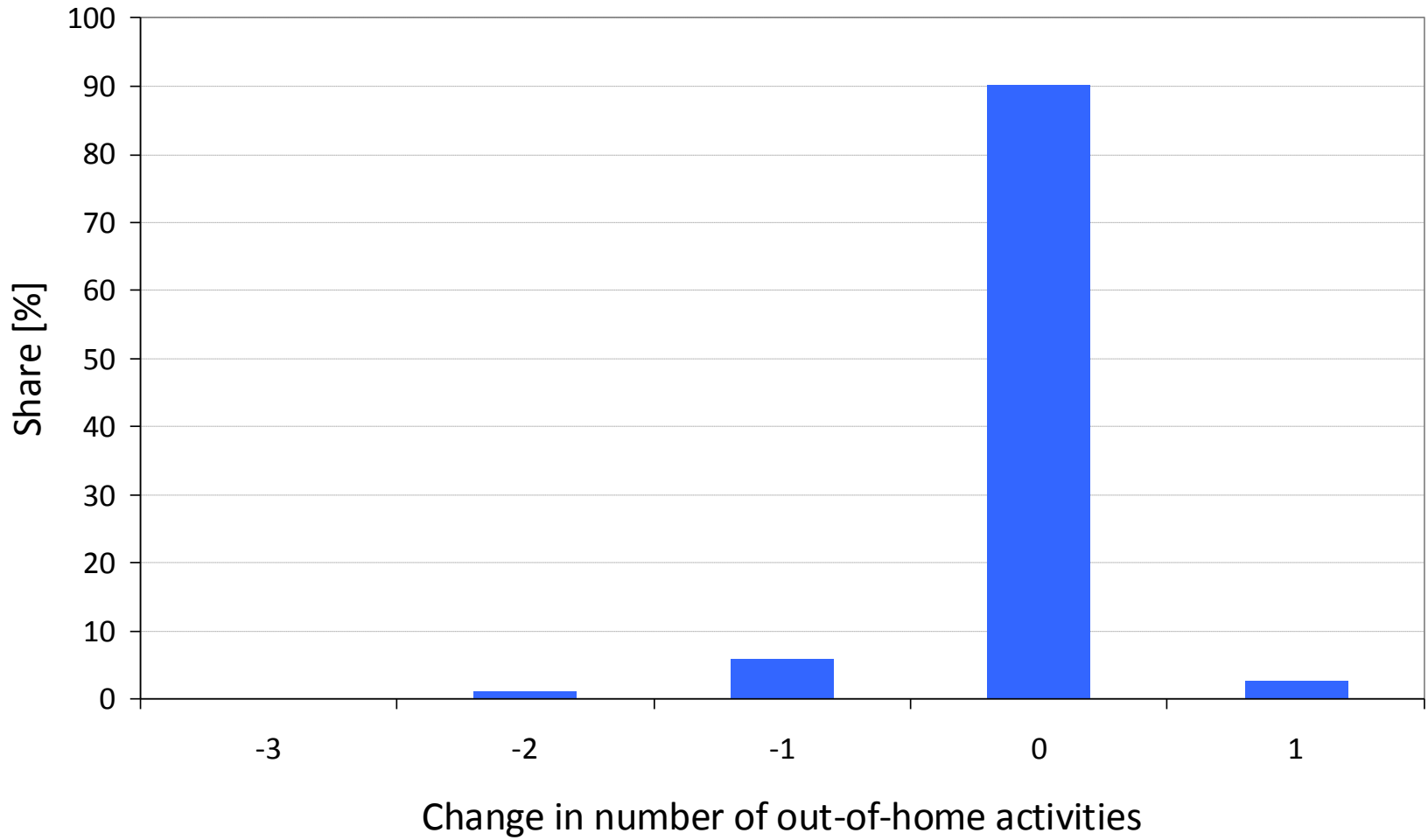
# Distribution of travel time changes

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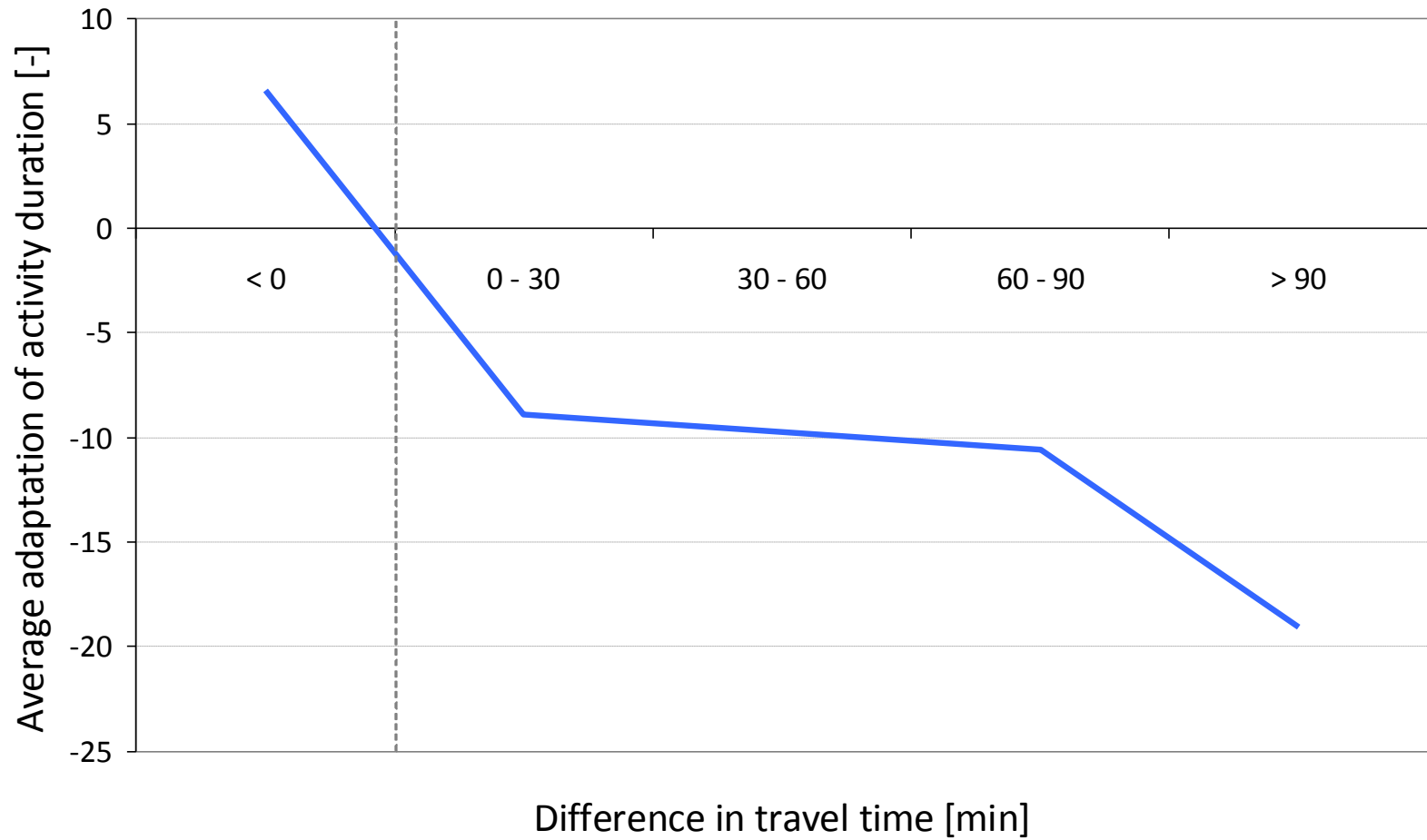
# Reactions: Number of activities

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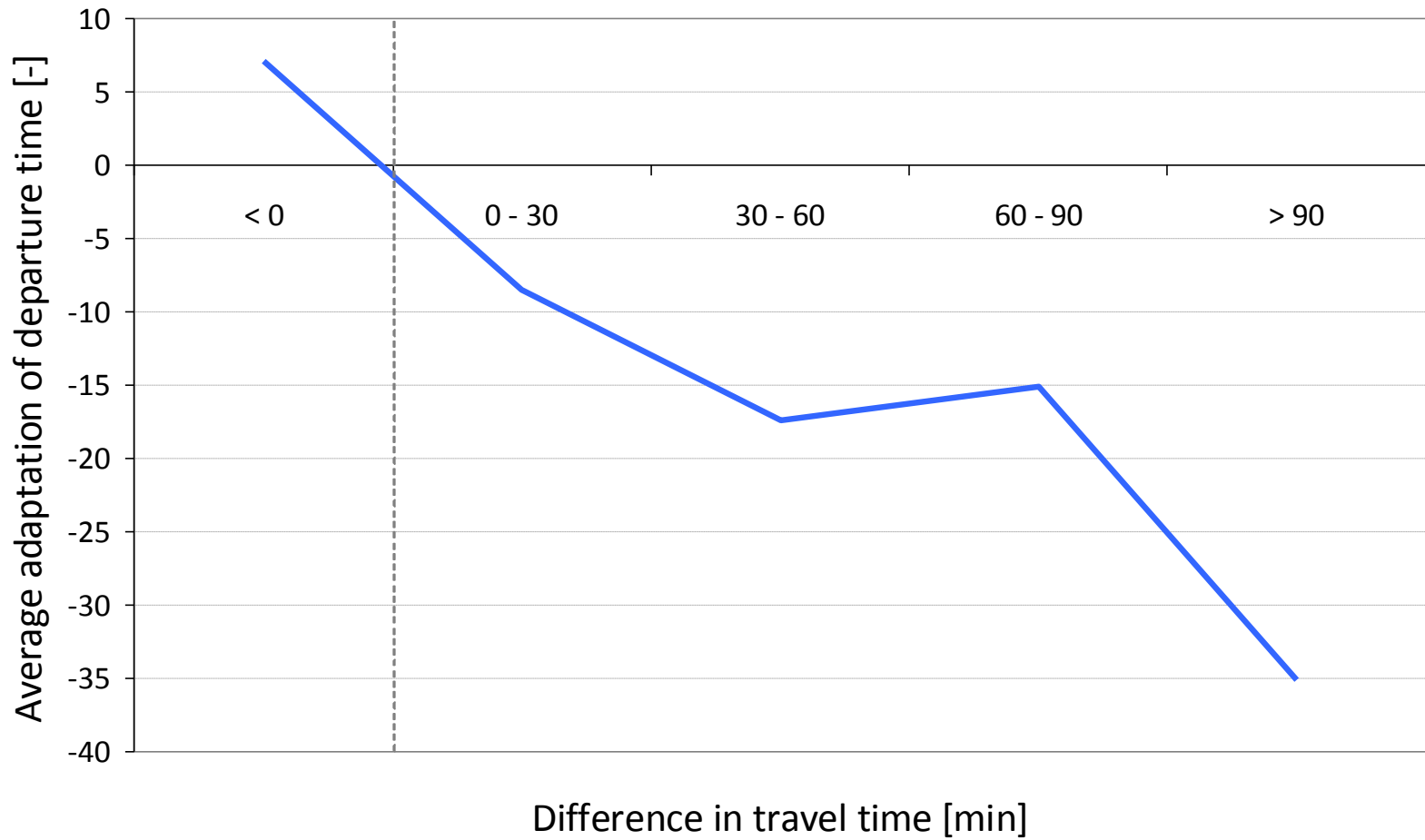
# Reactions: Activity duration

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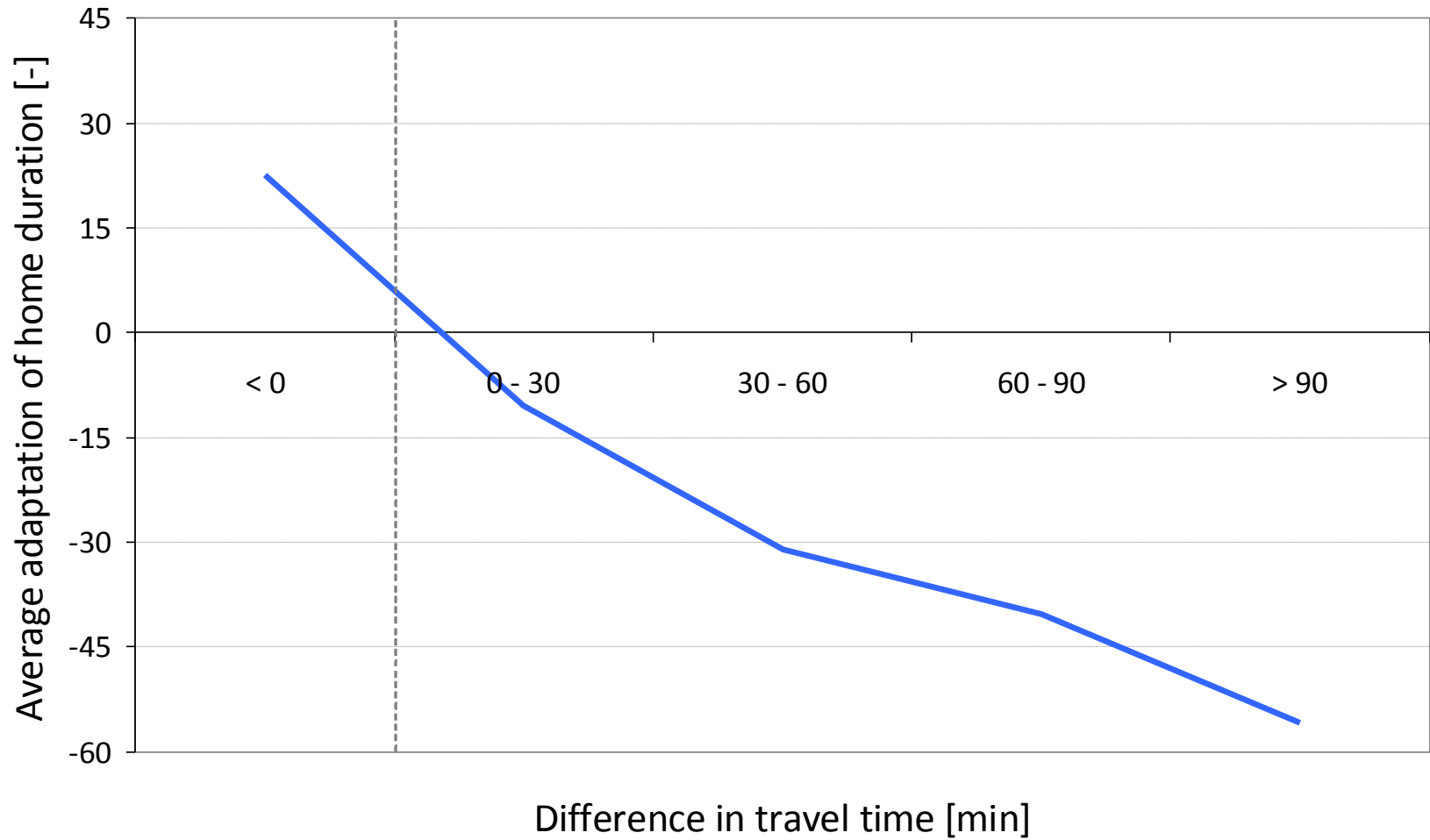


# Reactions: Departure time of first trip

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# Reactions: Time at home



# Proposed modelling framework

Model	Model type	Input	Output
(1)	MNL	<ul style="list-style-type: none"> <li>• Time gain / loss</li> <li>• Socio-economic data</li> </ul>	Compensation yes / no
(2) (if “yes”)	Regression	Time gain / loss	Amount of compensated time
(3)	MDCEV	<ul style="list-style-type: none"> <li>• Amount of compensated time</li> <li>• Structure of reported schedule</li> </ul>	Split-up of compensated time: <ul style="list-style-type: none"> <li>• Departure time</li> <li>• Travel time</li> <li>• Activity duration</li> </ul>
(4)	CNL	<ul style="list-style-type: none"> <li>• Compensated travel time</li> <li>• Compensated activity duration</li> <li>• Structure of reported schedule</li> </ul>	Additional adaptations: <ul style="list-style-type: none"> <li>• None</li> <li>• Less / more activities</li> <li>• Less / more tours</li> <li>• Mode changes</li> </ul>

(Separate model parameters are estimated for time gains / losses.)

## MDCEV: Parameter estimates; $\rho^2 = 0.234$

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Reaction	Variable	Parameter	
		Time gain	Time loss
Departure	Satiation	<b>0.139</b>	<b>0.266</b>
Travel time	Constant	-0.500	<b>-1.166</b>
	Compensated time	0.386	<b>0.691</b>
	Satiation	1.119	<b>1.324</b>
Activity duration	Constant	<b>-3.629</b>	<b>-2.967</b>
	Compensated time	<b>3.004</b>	<b>1.120</b>
	At-home time	0.726	
	Out-of-home time		<b>1.162</b>
	Satiation	0.359	<b>0.393</b>

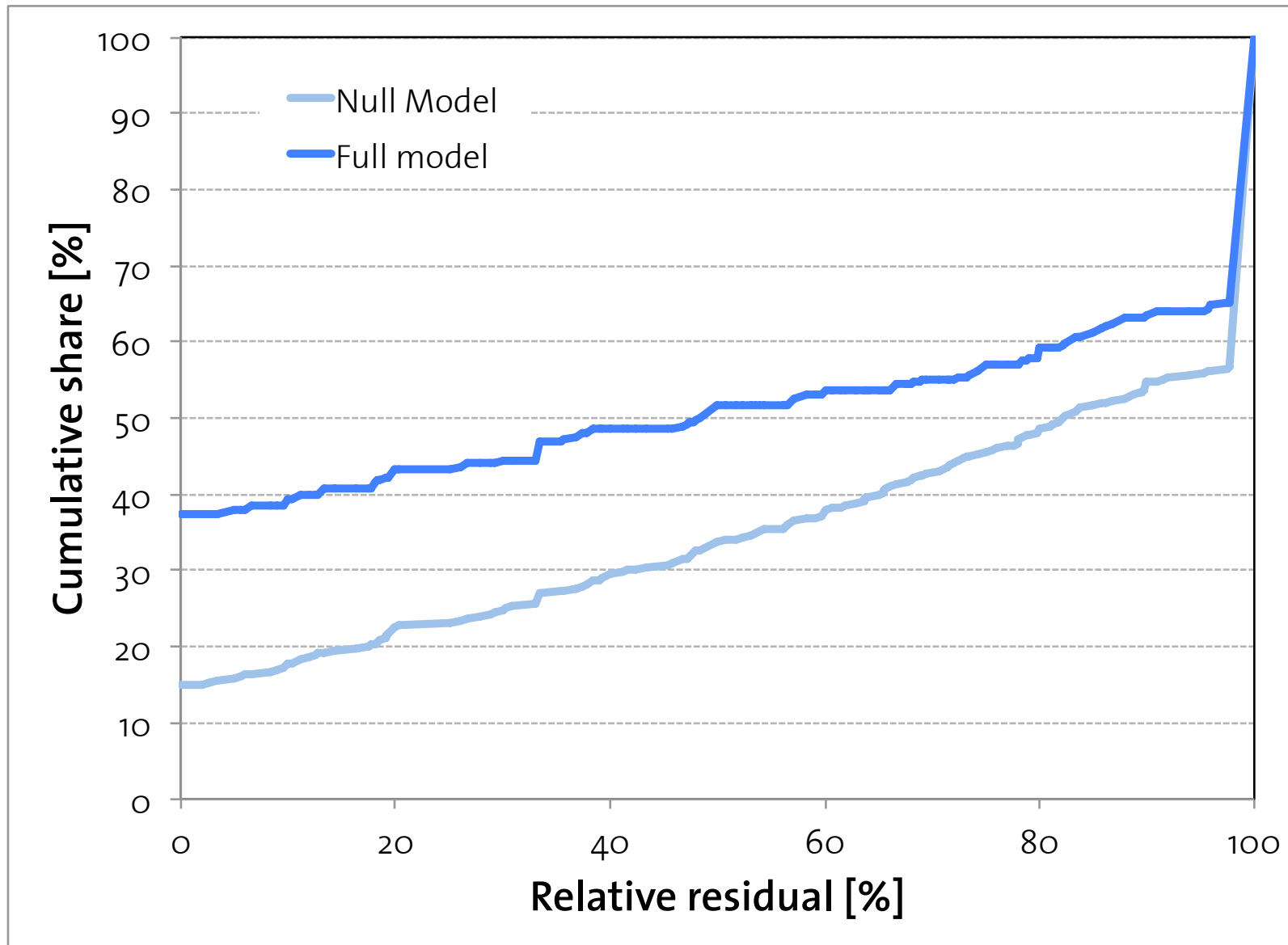
# Hit ratio comparison

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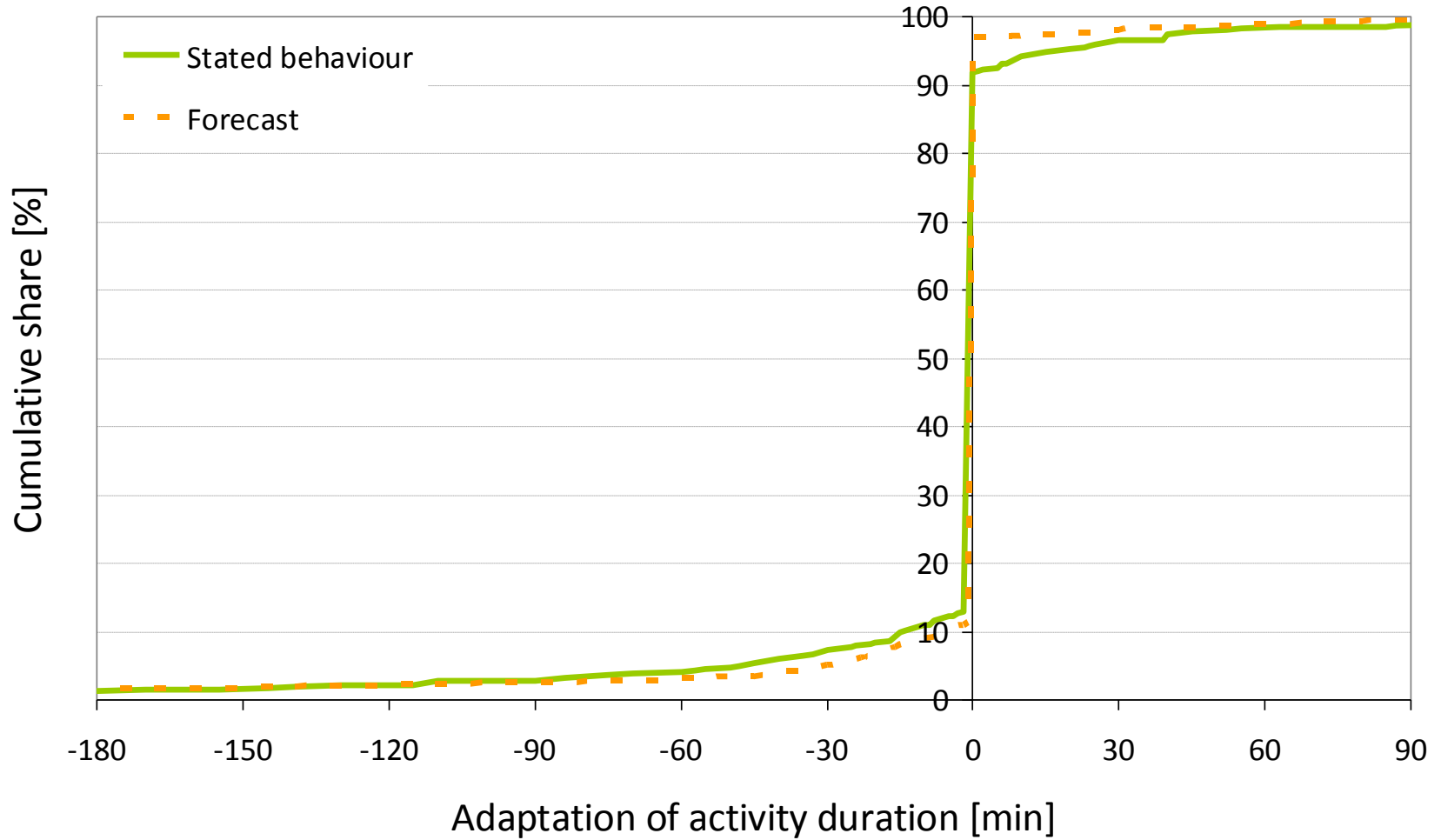
Model	Alt.	Saturation	Rep	Hit Ratio [%]		
				Mean	< 5%	> 50%
Full Model	3	gamma	50	69.0	4.3	69.2
Null Model			50	58.2	9.9	53.8



# Residuals: Full versus Null-model



# Model results: MDCEV, activity duration



# Conclusions

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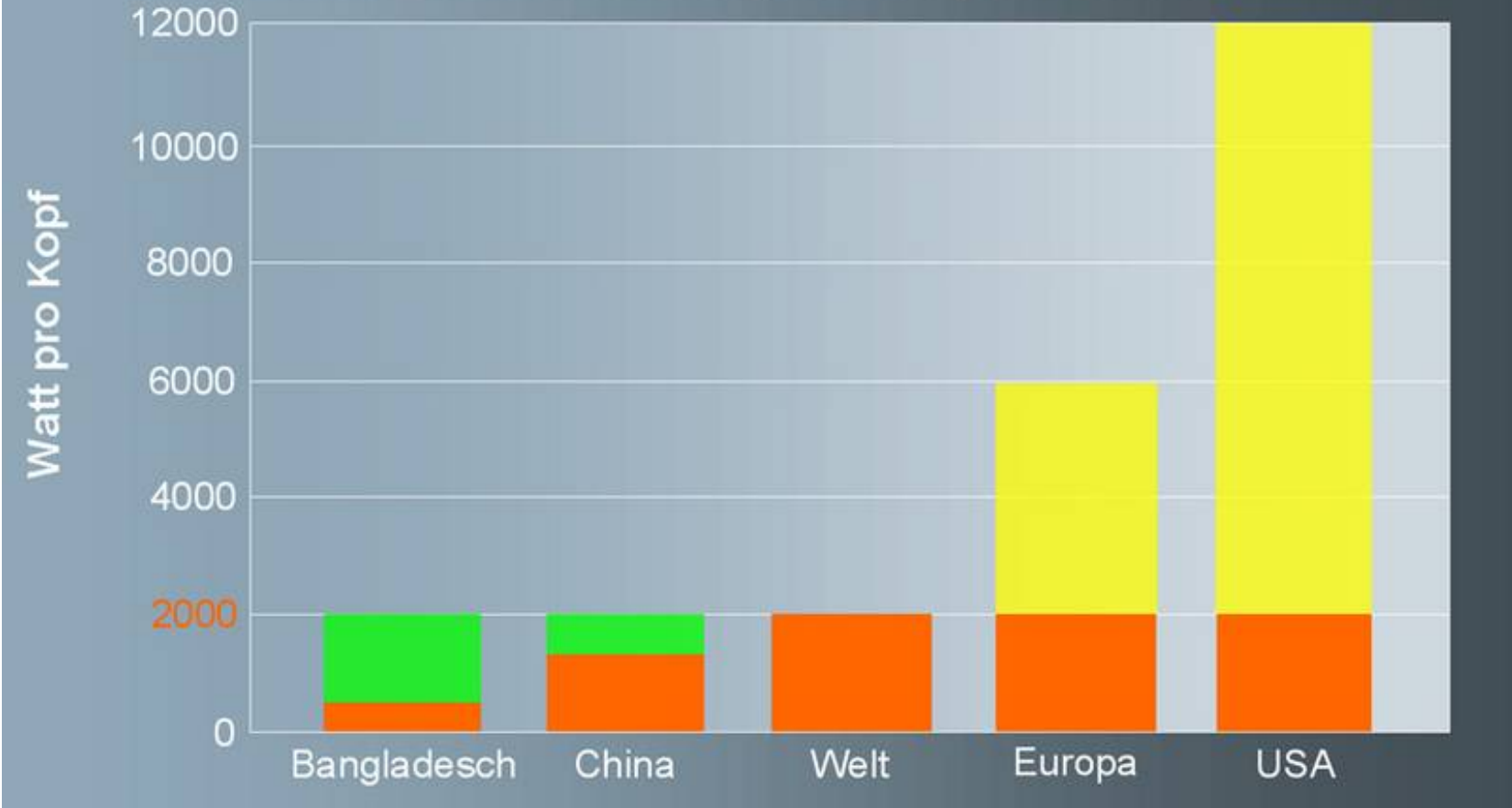
Predominant scheduling adaptations:

- Departure times
  - Travel times
    - Mode changes
    - Destination changes (not explicitly modelled)
- Model framework correctly predicts these adaptations
- No conclusive evidence of induced travel effects in the sense of more/less activities or tours / changing structures of the reported schedules!
- Matches results from the first part of the project, where substantial elasticities were found, but very little change in the explanatory variables can be expected in real life

# Energy savings and CO<sub>2</sub> reduction across “budgets”

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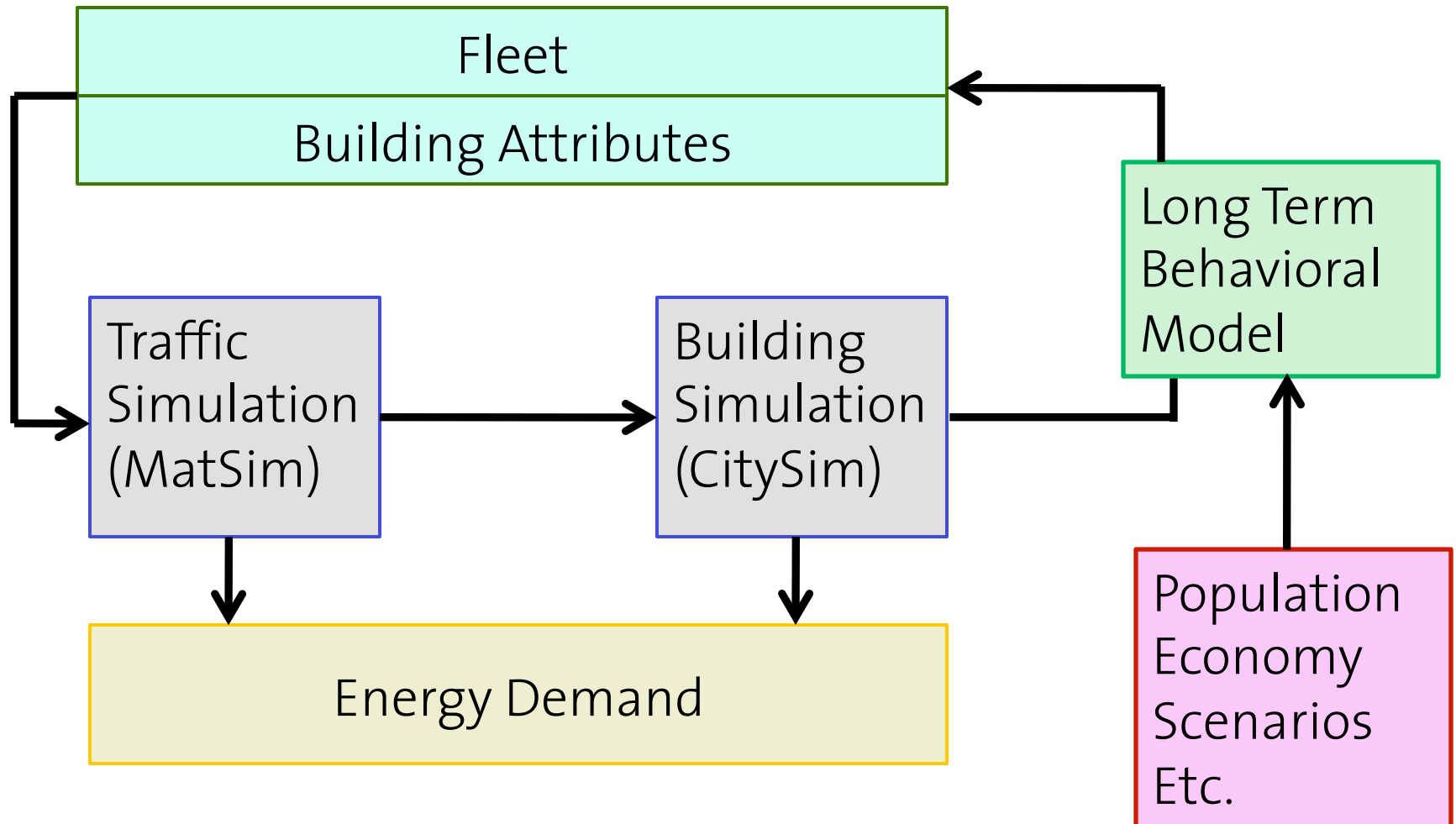
# 2000W society vs current energy flows



Source: Novatlantis

# Framework of the 2000 W project

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# Survey protocol

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- Announcement letter
- CATI recruitment interview
  - Information to construct the SC
- PAPI SC – questionnaire
  - SC experiments on energy savings
  - Information to construct the PE
  - Socio-demographics
  - Expected pay-pack period
- Web-based priority evaluator (PE) on CO<sub>2</sub> - reduction

## Survey response

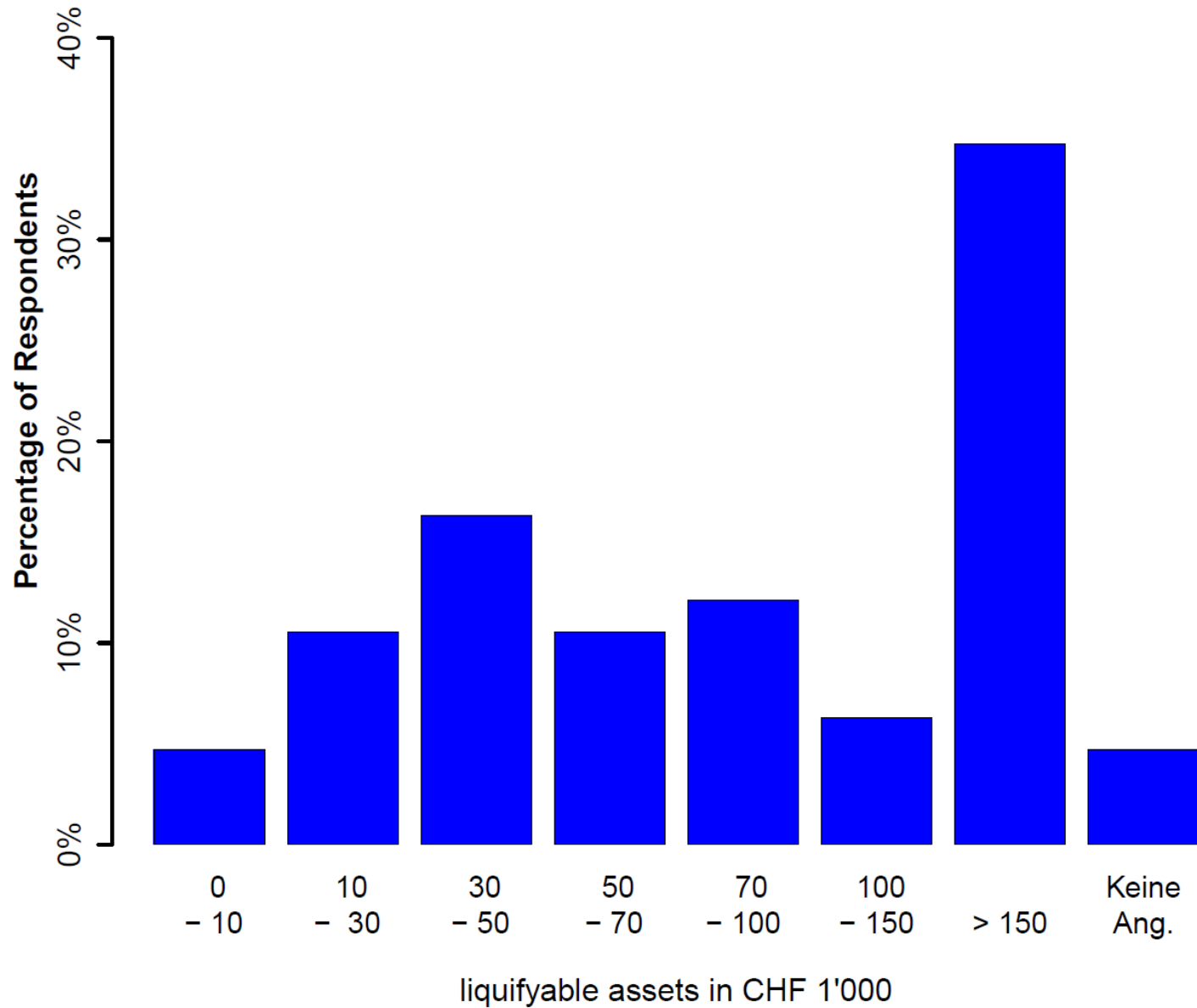
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	N	Share [%]			
• Sample size	2219	100.0			
• Not reached	459	20.7			
• Invalid	448	20.2			
• Contacted	1312	59.1	100.0		
• Agreed to PAPI	591	26.6	45.1	100.0	
• Returned complete survey	411	18.5	31.3	69.5	
• PE invitation sent	406	18.3	30.9	68.7	100.0
• PE completed	311	14.0	23.7	52.6	78.6



# Respondents: Wealth Distribution of Homeowners

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# Sample bias in the response of home owners

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- Overrepresented:
  - Well educated people
  - Older people (> 65)
  - Houses built prior to 1990
  - Male respondents
- Underrepresented:
  - Younger persons (<45)
  - Modern houses
  - Female respondents

# SC Survey

## Szenario 3

					
Massnahme	Keine Veränderung	Haus isolieren	Wärmepumpe einbauen	Sparsameres Auto kaufen	CarSharing und ÖV
Investition	0 CHF	60'000 CHF	40'000 CHF	10'000 CHF	Gewinn auf Verkauf Auto
	<b>Benzinpreis: 3 CHF / Liter =&gt; Variable Mobilitätskosten: 7'800 CHF / Jahr</b>				
Fahrleistung PW	20'000 km/Jahr	20'000 km/Jahr	20'000 km/Jahr	20'000 km/Jahr	6'000 km/Jahr
Einsparungen Mobilitätskosten	0 CHF/ Jahr	0 CHF/ Jahr	0 CHF/ Jahr	1'600 CHF/Jahr	7'000 CHF/Jahr
	<b>Heizölpreis: 250 CHF / 100 Liter: =&gt; Heizkosten 5'000 CHF / Jahr</b>				
Einsparung Heizkosten	0 CHF/Jahr	1'500 CHF/Jahr	3'500 CHF/Jahr	0 CHF/Jahr	0 CHF/Jahr
CO <sub>2</sub> Einsparung	0 Tonnen CO <sub>2</sub> /Jahr	1.6 Tonnen CO <sub>2</sub> /Jahr	3.7 Tonnen CO <sub>2</sub> /Jahr	0.7 Tonnen CO <sub>2</sub> /Jahr	3.3 Tonnen CO <sub>2</sub> /Jahr
Ihre Wahl →	▼ <input type="checkbox"/>	▼ <input type="checkbox"/>	▼ <input type="checkbox"/>	▼ <input type="checkbox"/>	▼ <input type="checkbox"/>

# Priority Evaluator - Start

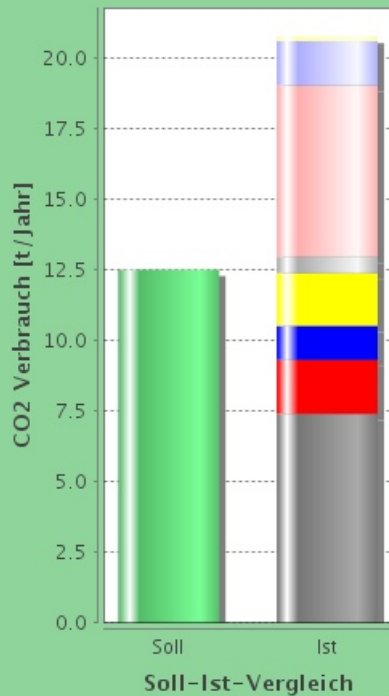


# Priority Evaluator - End

Befragung beenden und Daten abschicken

Eingaben nur speichern

Ausloggen



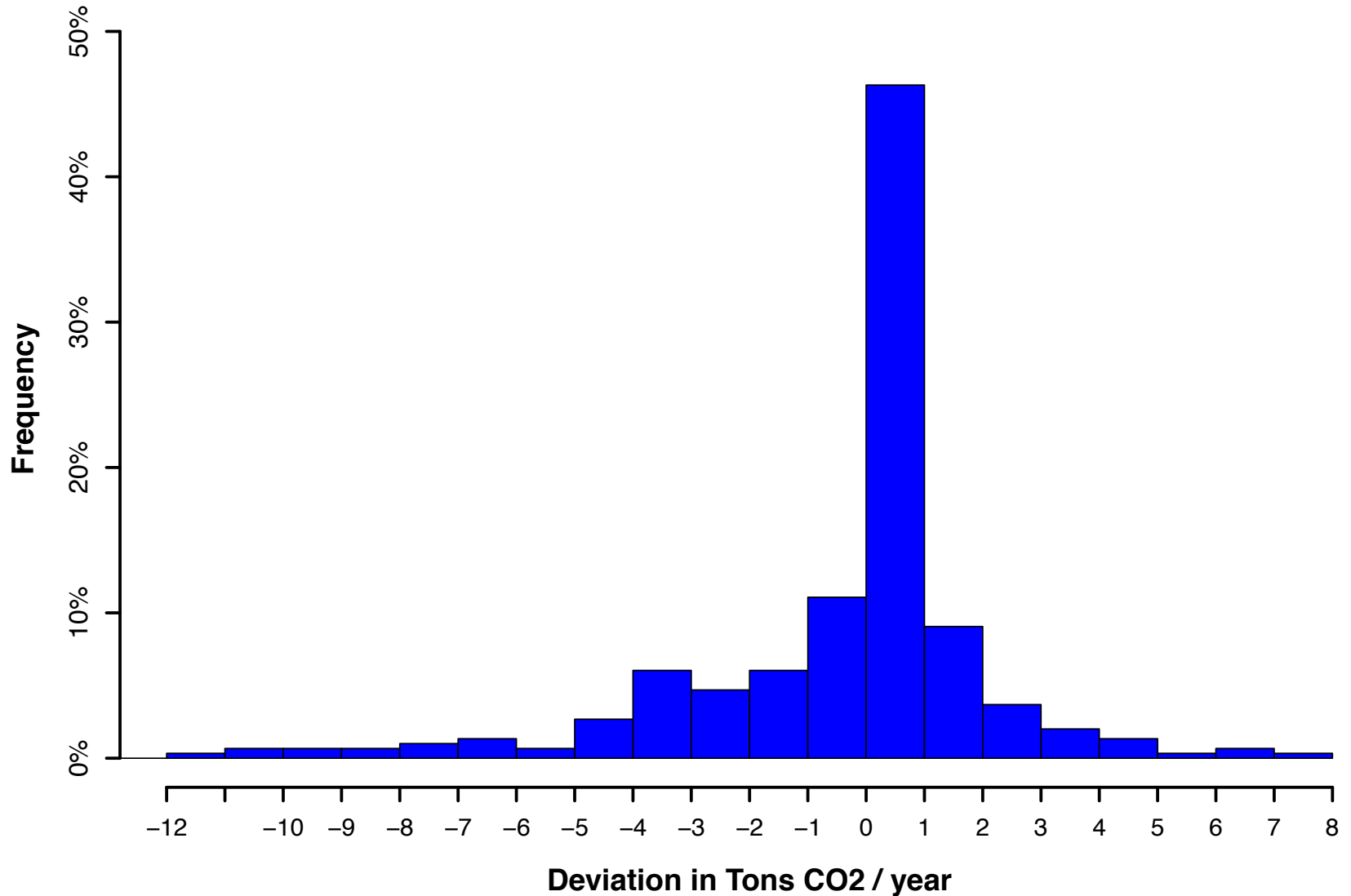
**Gratulation - Sie haben die benötigte CO2 Reduktion erreicht!**

gewählt?	Option	Ausgestaltung	Einmalig [CHF]	Jährlich [CHF/Jahr]
<input checked="" type="checkbox"/>	Dach dämmen		28,400	-600
<input type="checkbox"/>	Solaranlage installieren		0	0
<input type="checkbox"/>	Fassade dämmen		0	0
<input type="checkbox"/>	kontrollierte Lüftung		0	0
<input checked="" type="checkbox"/>	Wärmepumpe		41,300	-1,200
<input type="checkbox"/>	Temperaturreduktion um	5°C	0	0
<input checked="" type="checkbox"/>	Fahrleistung Auto 1 reduzieren auf (Citroen)	80%	0	-700
<input checked="" type="checkbox"/>	sparsameres Auto 1 (Citroen)		5,000	-600
<input type="checkbox"/>	Auto 1 verkaufen (Citroen)		0	0
<input type="checkbox"/>	GA kaufen	0	0	0
<input type="checkbox"/>	Mittelstreckenflüge reduzieren um	0	0	0
<input type="checkbox"/>	Haushalt ernährt sich vegetarisch	0%	0	0
<input checked="" type="checkbox"/>	CO2 Kontingent kaufen	1	0	1,000
<b>Summe</b>			<b>74,700</b>	<b>-2,100</b>

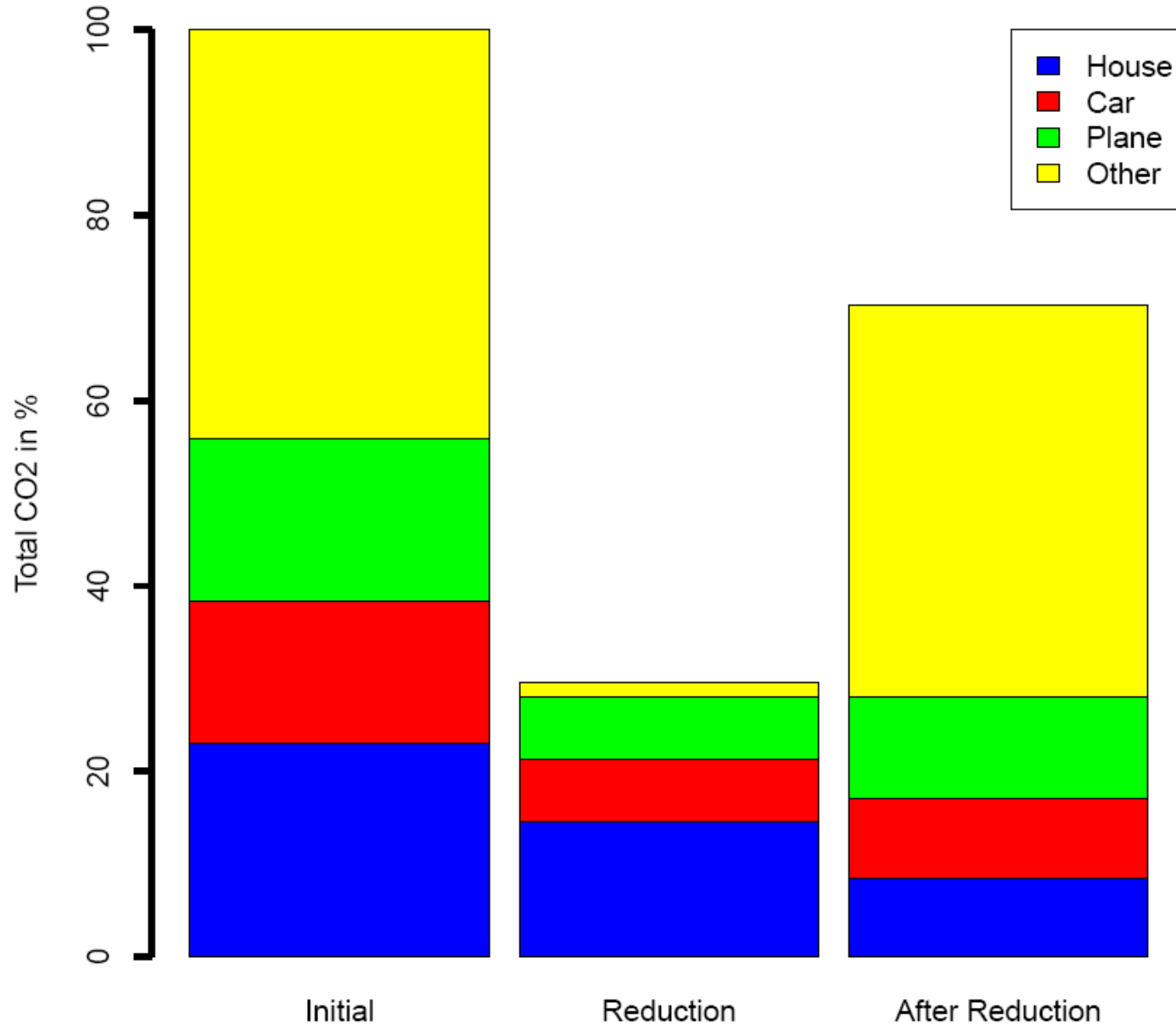


# Priority Evaluator: Matching the target

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# Priority Evaluator: CO2 Reduction



# MCDEV: Estimation Results; $\rho^2 = 0.51$

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Alternative	Const.	In- come	Age	Age House	Size House	PCCC	People	Good Cond.	Bad Cond.	Gam ma
Roof	<b>1.98</b>	-0.07		0.02	0.02			-1.27	0.44	<b>0.15</b>
Solar	*1.04	-0.04								<b>0.08</b>
Facade	0.23	-0.02		<b>0.03</b>				-0.35	<b>1.15</b>	<b>0.31</b>
Ventilation	-0.99	*0.10		<b>-0.19</b>						<b>0.12</b>
Temperature	1.44	-0.04	0.06							<b>0.02</b>
Heat Pump	0.32	-0.06	*0.17	*-0.03	<b>0.24</b>					<b>0.41</b>
New Car	0.98	0.00	-0.03			*-0.50				<b>0.19</b>
Mileage red.	<b>1.82</b>	-0.05	0.12			-0.09				<b>0.13</b>
Flights	<b>2.12</b>	-0.05								<b>0.20</b>
Window	<b>3.11</b>	<b>-0.17</b>		-0.03	-0.01					0.09
Vegi	-0.89	0.01					0.42			0.07
Certificate										0.32

**Bold:** 95% Significance, \*: 90% Significance

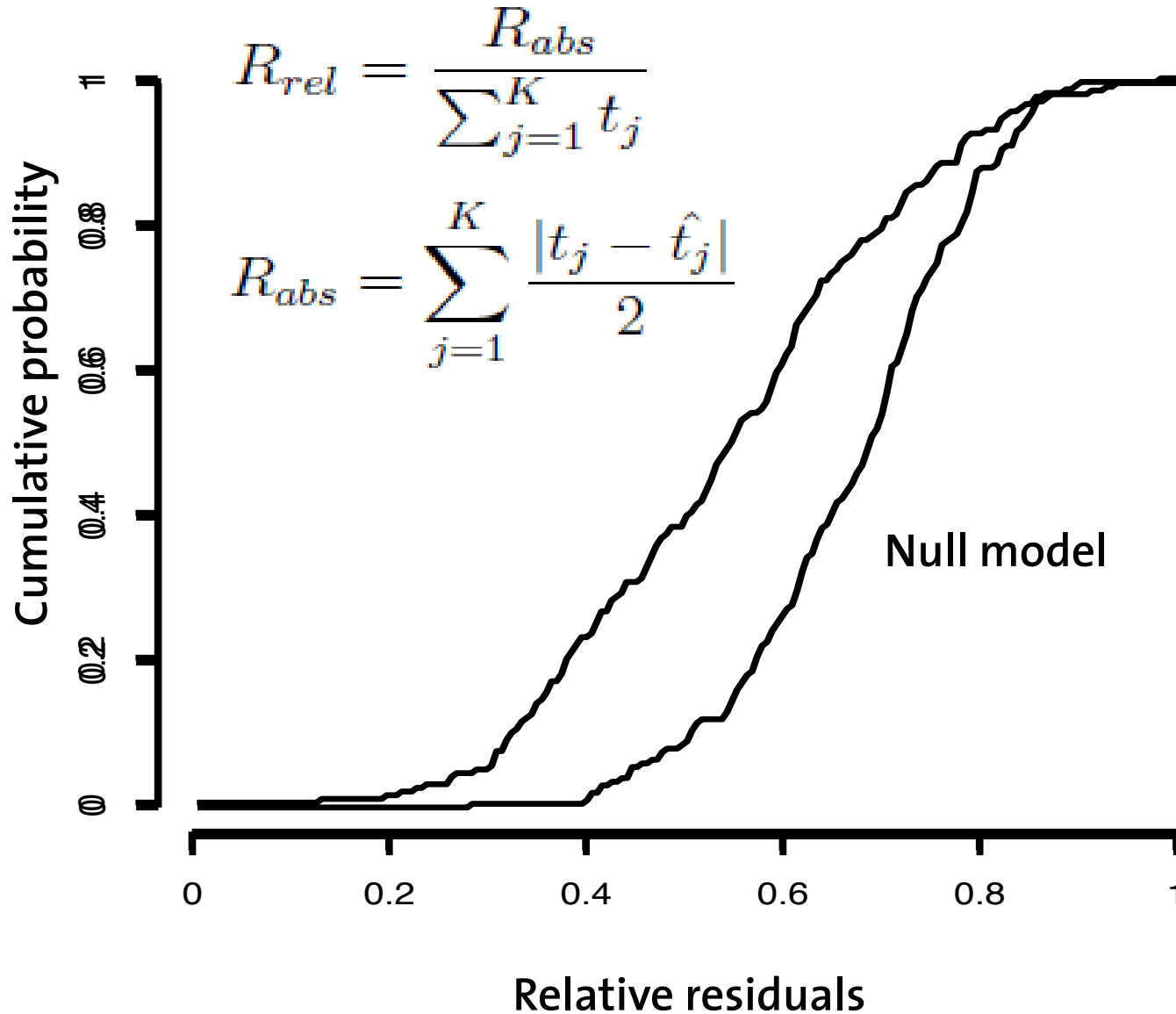


# Hit ratio comparison

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Model	Alt.	Saturation	Rep	Hit Ratio [%]		
				Mean	< 5%	> 50%
PE Model	12	gamma	50	81.8	0.0	96.9
PE Null Model			50	51.7	0.0	69.0

# Residuals: Best versus Null-model



# Conclusions

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- Different sensitivities across sectors
- Internal rate of return is consistent (SC evidence)
- PE successful, but expensive

# Three studies: What have we learned ?

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# Summary

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- The surveys are feasible and valuable, but still expensive (and slow)
- Stated adaptation surveys can be fully analysed today
- MDCEV promising, but more work needed
  - Measures of goodness of fit
  - Forecasting tools need further work
  - Nesting structures beyond NL

Questions ?

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[www.matsim.org](http://www.matsim.org)

[www.ivt.ethz.ch](http://www.ivt.ethz.ch)

# Literature

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- Erath, A. and K.W. Axhausen (2010) Long term fuel price elasticity: effects on mobility tool ownership and residential location choice, final report to BFE and BAFU, IVT, ETH Zurich, Zurich.
- Erath, A. and K.W. Axhausen (2009) Mobility Costs and Residence Location Choice, paper presented at the *9th Swiss Transport Research Conference*, Ascona, October 2009.
- Jäggi, B. and K.W. Axhausen (2010) Surveying energy efficiency in housing and transport using a Priority Evaluator, *Arbeitsberichte Verkehrs- und Raumplanung*, **636**, IVT, ETH Zürich, Zürich.
- Weis, C., C. Dobler and K.W. Axhausen (2010) An Interactive Stated Adaptation Survey of Activity Scheduling Decisions, *Arbeitsberichte Verkehrs- und Raumplanung*, **637**, IVT, ETH Zürich, Zürich.
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