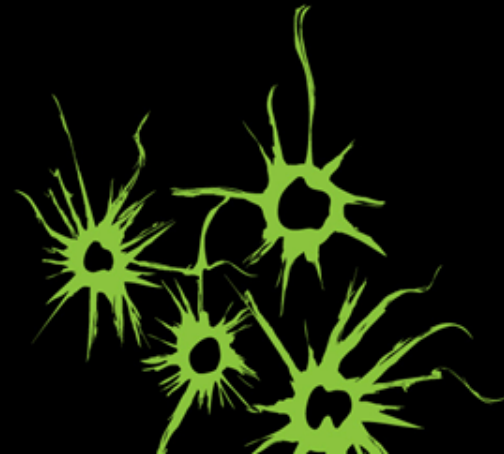
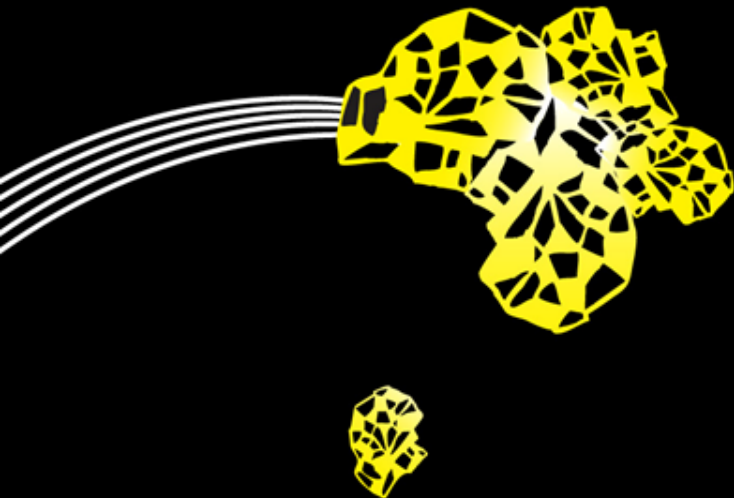


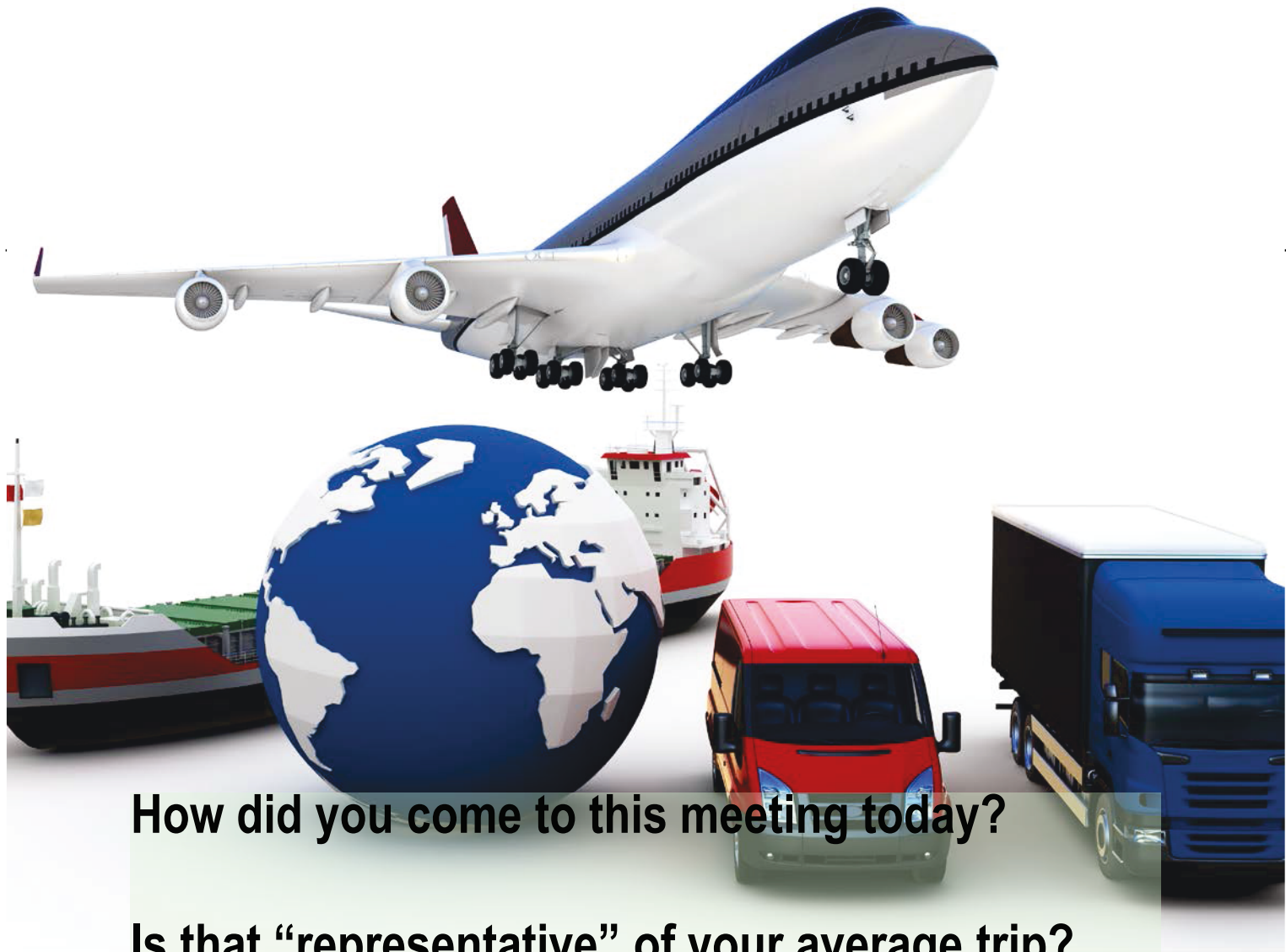
Measurement of non-random attrition effects on mobility rates using trip diaries data

Dr. Ing. Lissy La Paix

University of Twente. -

MPN symposium . - September 2016





How did you come to this meeting today?

Is that “representative” of your average trip?

Would you repeat the same travel choices tomorrow?

Understanding of
people's travel behaviour

Cross-sectional travel surveys

Traffic flows are maximal

**Choices will vary over time,
if the system changes**

Assume **that behaviour adjusts
instantaneously**

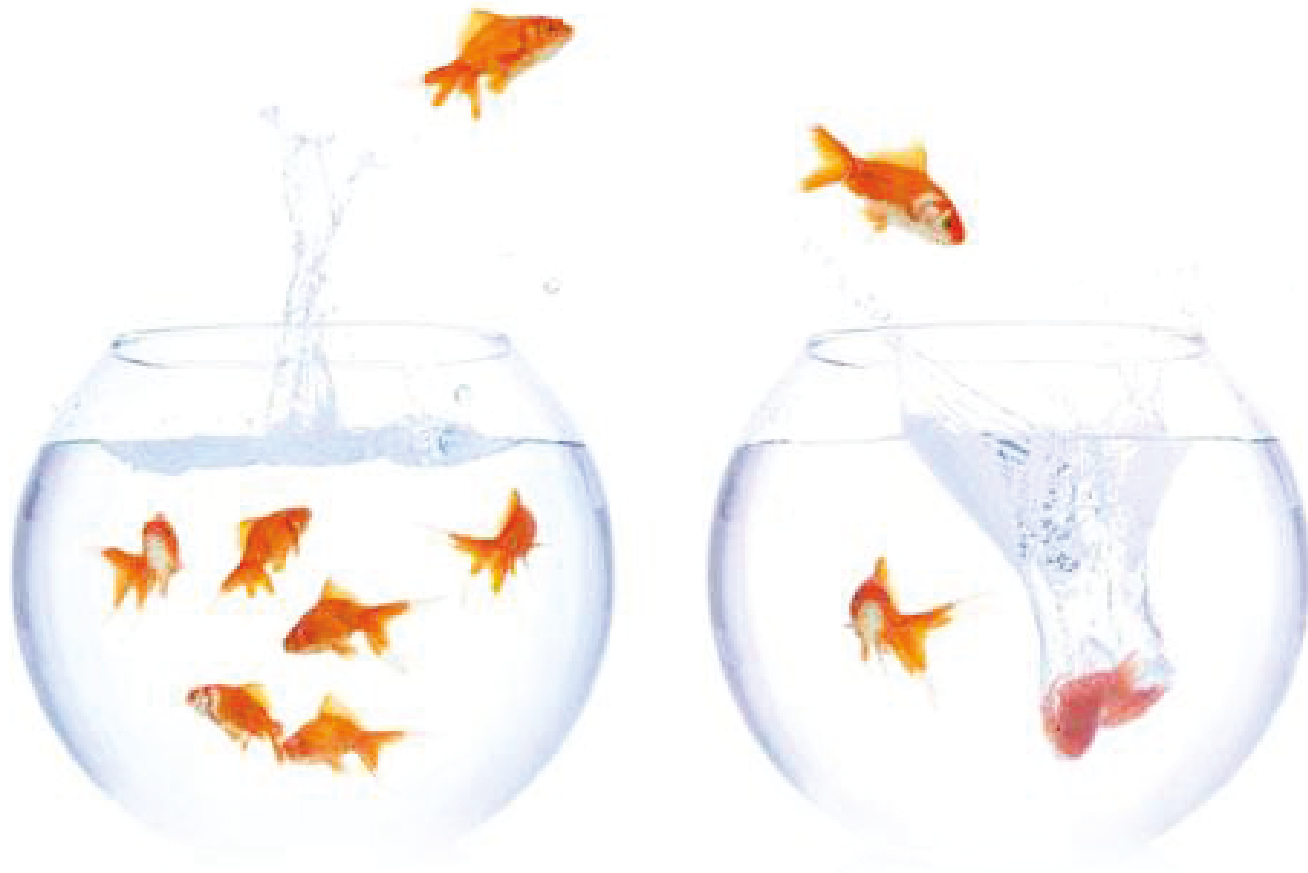
Highly repetitive in the short run

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**Change is a process,
not an event.**

50%



Between 20 and 40 percent
What is the impact in mobility rates?
Does it introduce non-random variation in reported trips?



Does attrition mask the variation in reported trip rates?

- SE factors, spatial accessibility, life events, lifestyle

Panel
attrition

Drop-outs:

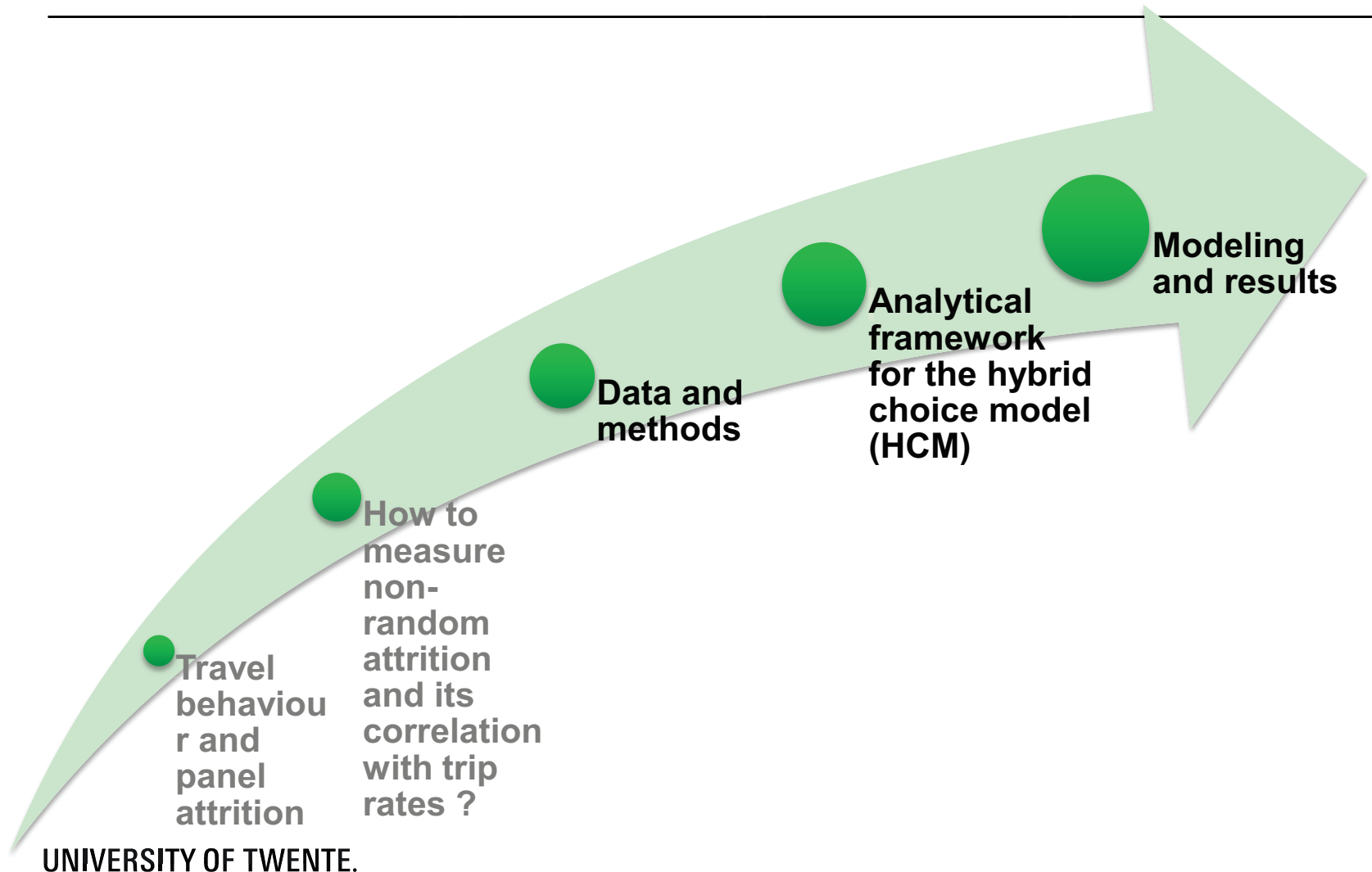
- How to measure non-random attrition?



Model dynamics in trip rates

- Hybrid choice model
- Panel data, MPN, Mobility Panel of the Netherlands

Outline



Survey

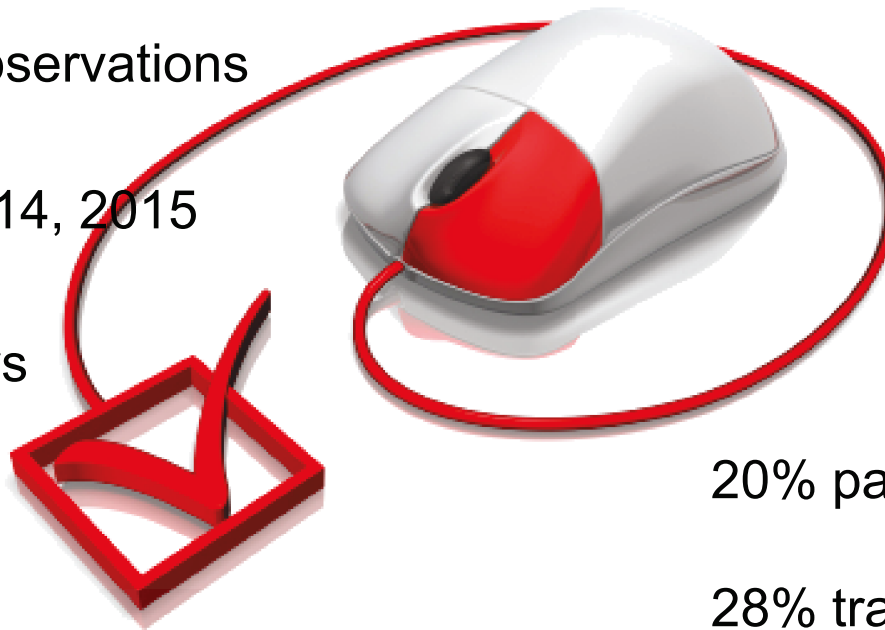
5 402 households
11, 322 individuals participated
39% households – 3 waves

7 000 diaries-respondents

40 000 observations

2013, 2014, 2015

3 survey days



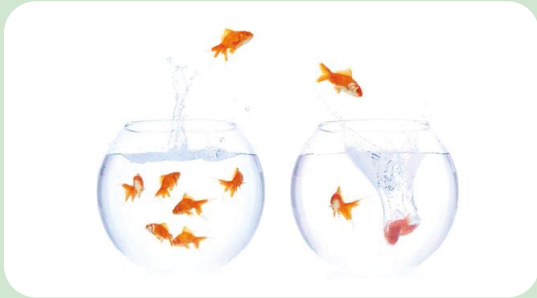
However,

20% participants drop out

28% travel diaries lost

Why ?

We analyse



Attrition
between
waves:
stayers,
temporary
drop-outs



Attrition within
at household
level



Completeness:
- N. of
questionnaires
and/or diaries –
individual and
household level

Factor scores from factor analysis

Indicators	LV 1	LV 2	LV
Attrition_within	0.13	<u>-0.89</u>	LV 2: attrition
Attrition_between	-0.54	<u>-0.58</u>	LV2: attrition
Number of completed questionnaires (waves)	<u>0.91</u>	0.03	LV 1: completeness
Number of completed diaries (waves)	<u>0.71</u>	0.58	LV 1: completeness
Number of waves household is complete (based on questionnaire)	<u>0.85</u>	0.15	LV 1: completeness
Complete household based on diary (completehh_diary)	0.09	<u>0.78</u>	LV2: attrition

The results show ...



More attrition (less completeness)

- Female
- N kids
- N_auto > 2
- Hh size

Less attrition (more completeness)

- Gatekeeper
- Head hh
- High education
- Employment





Are those respondents with lower mobility rates more reluctant to complete the survey?

Do the stayers have higher mobility rates?

Attrition Bias

We developed a hybrid choice model

Choice model part
is trip rates:

- 0 trips
- 1-2 trips
- 3-4
- More than 4 trips

$$P(j_n | S_n, Z_n, Att_n; \beta; \sigma_\delta; \sigma_\varphi) = Prob [U_{jn} \geq U_{in}, \quad j \forall \in C_n]$$

Latent variable
model:

- 1) attrition
- 2) completeness

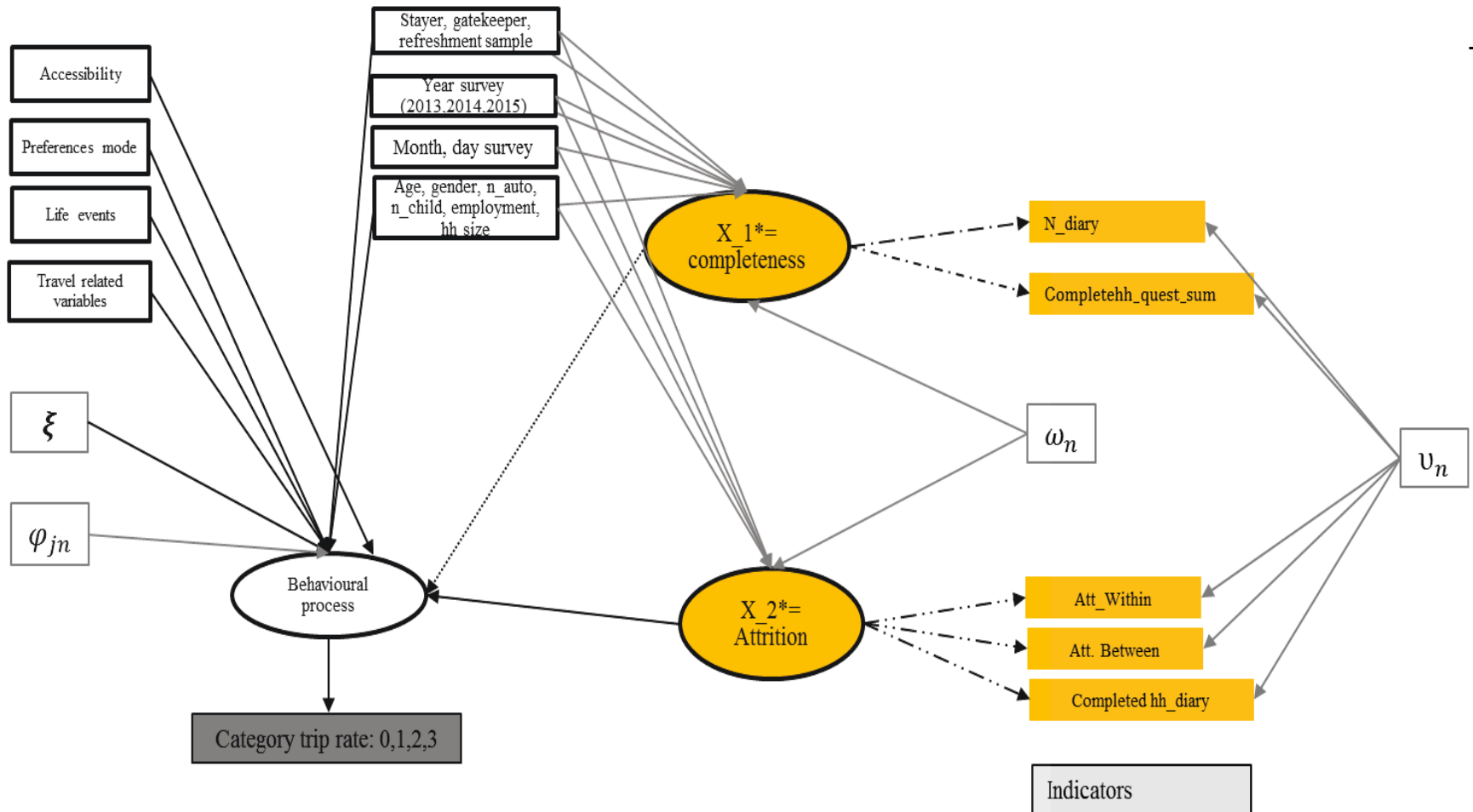
$$f_I(I_n | Att_n; \alpha, \sigma_v) = \frac{1}{\sigma_v} \phi \left(\frac{I_n - \alpha Att_n}{\sigma_v} \right)$$

Measurement
model (indicators
of):

- Attrition between (2), attrition within
- Completeness

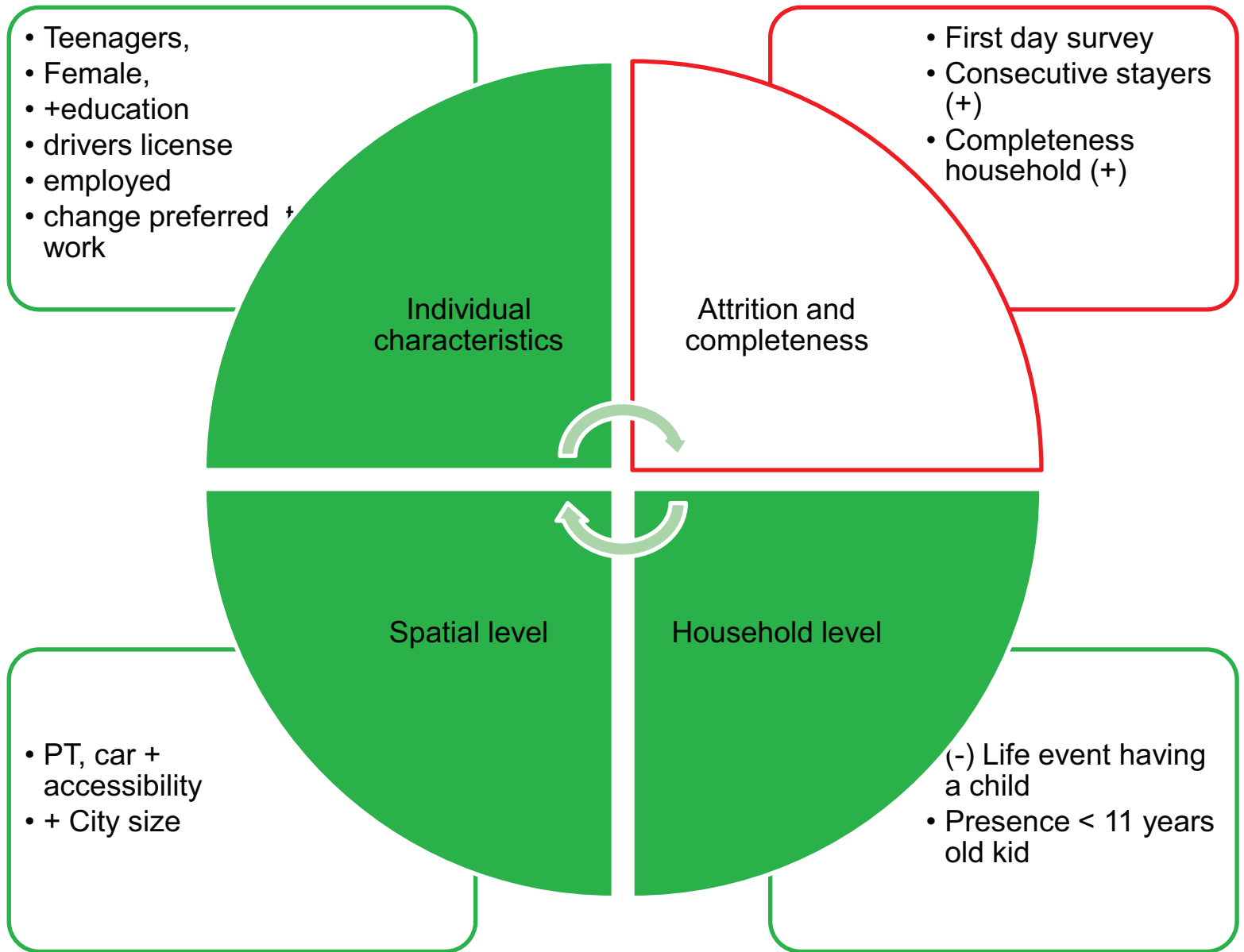
$$\mathcal{L} = \sum_n \sum_{i \in C_n} d_{jn} \log P(j, I_n | S_n, Z_n; \beta, \alpha, \lambda, \sigma_\varepsilon, \sigma_v, \sigma_\omega)$$

Explanatory variables

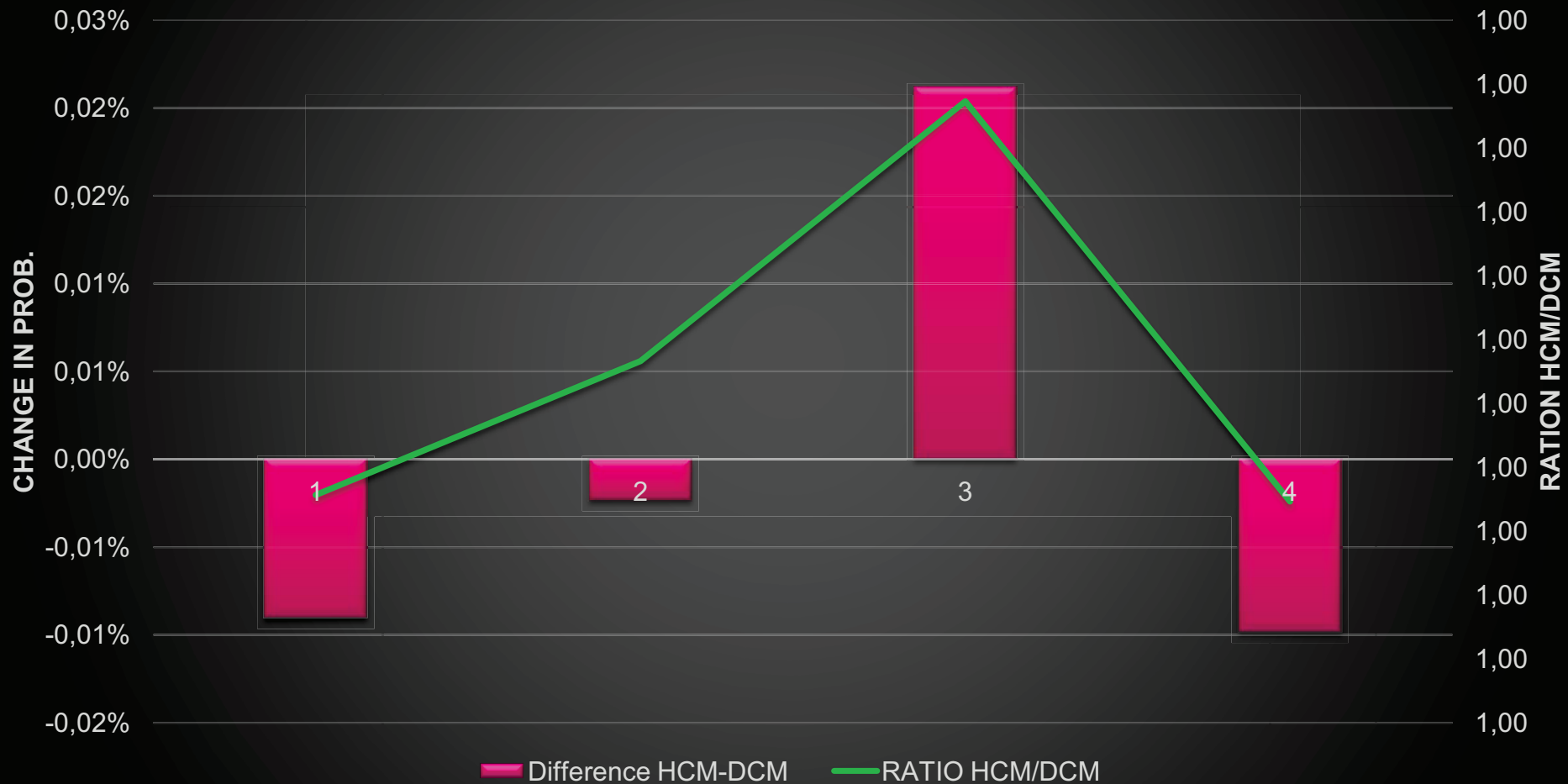


Choice model

Attrition and completeness model



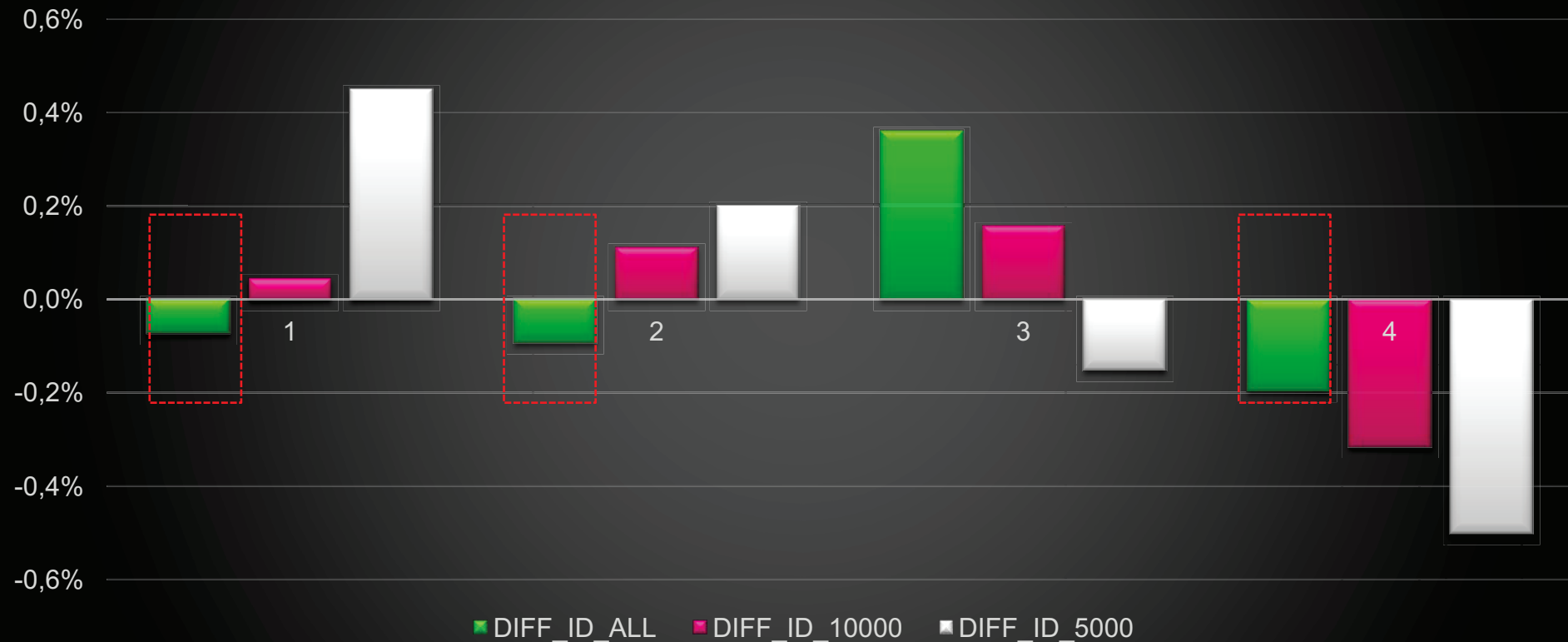
Difference in probabilities



It depends. Bias is minimal for large sample sizes.

And then? Is there any bias or not?

Difference in estimated probabilities HCM – DCM

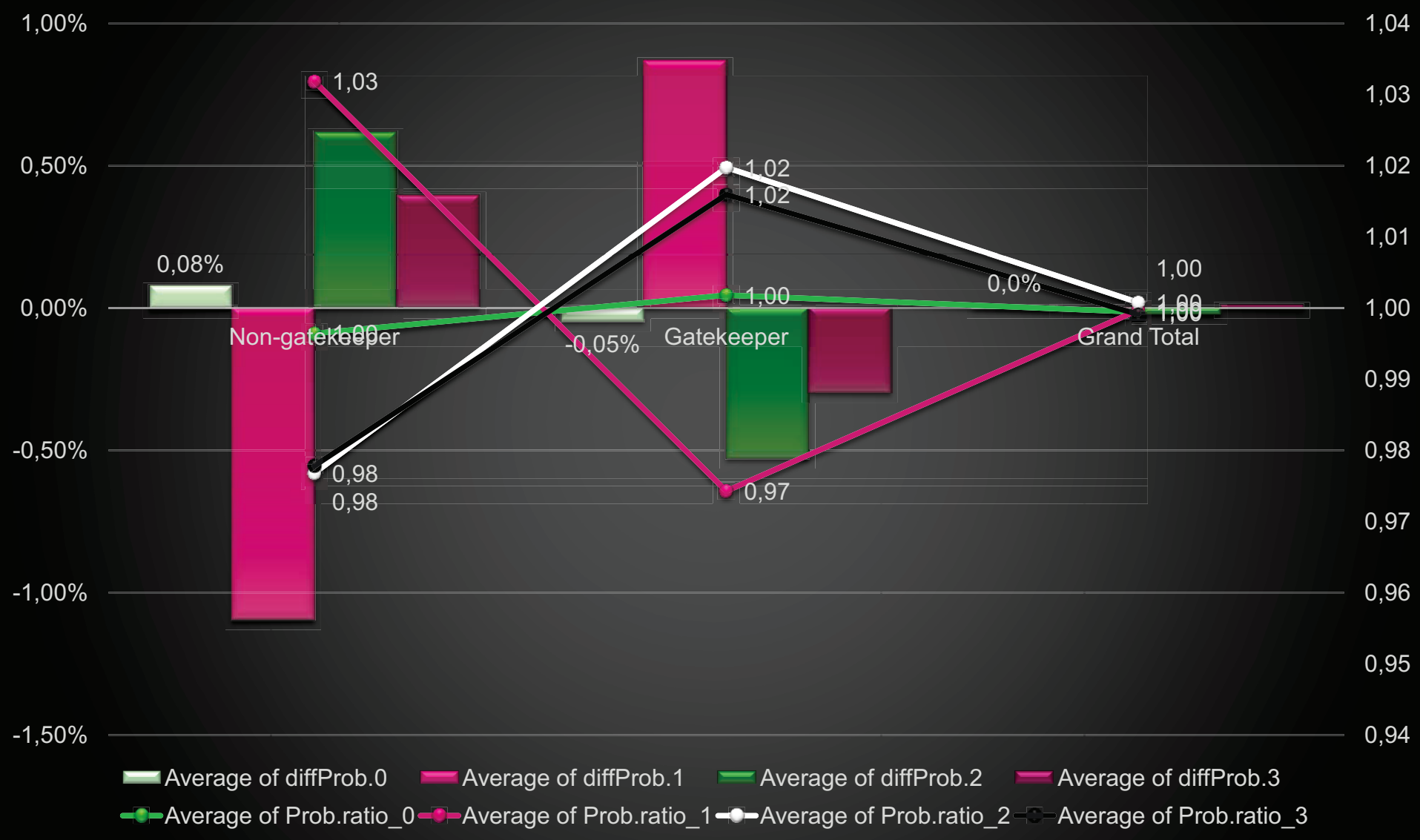


Reducing the sample size – increases the bias

Sensitivity analysis of different sample sizes was performed

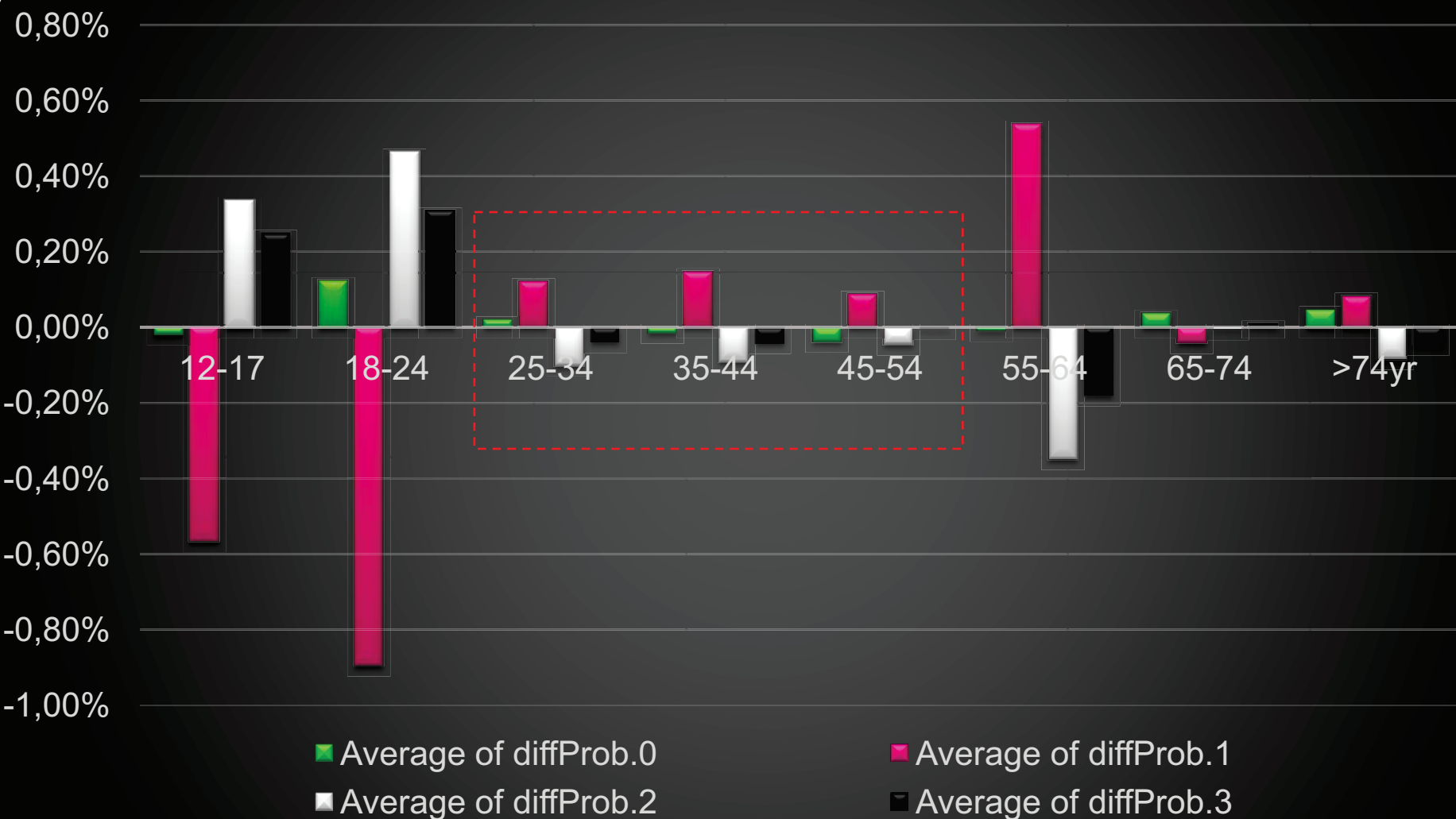
Difference between the estimated probability HCM (with attrition) and DCM (without attrition) model

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MOST RELIABLE: GATEKEEPERS

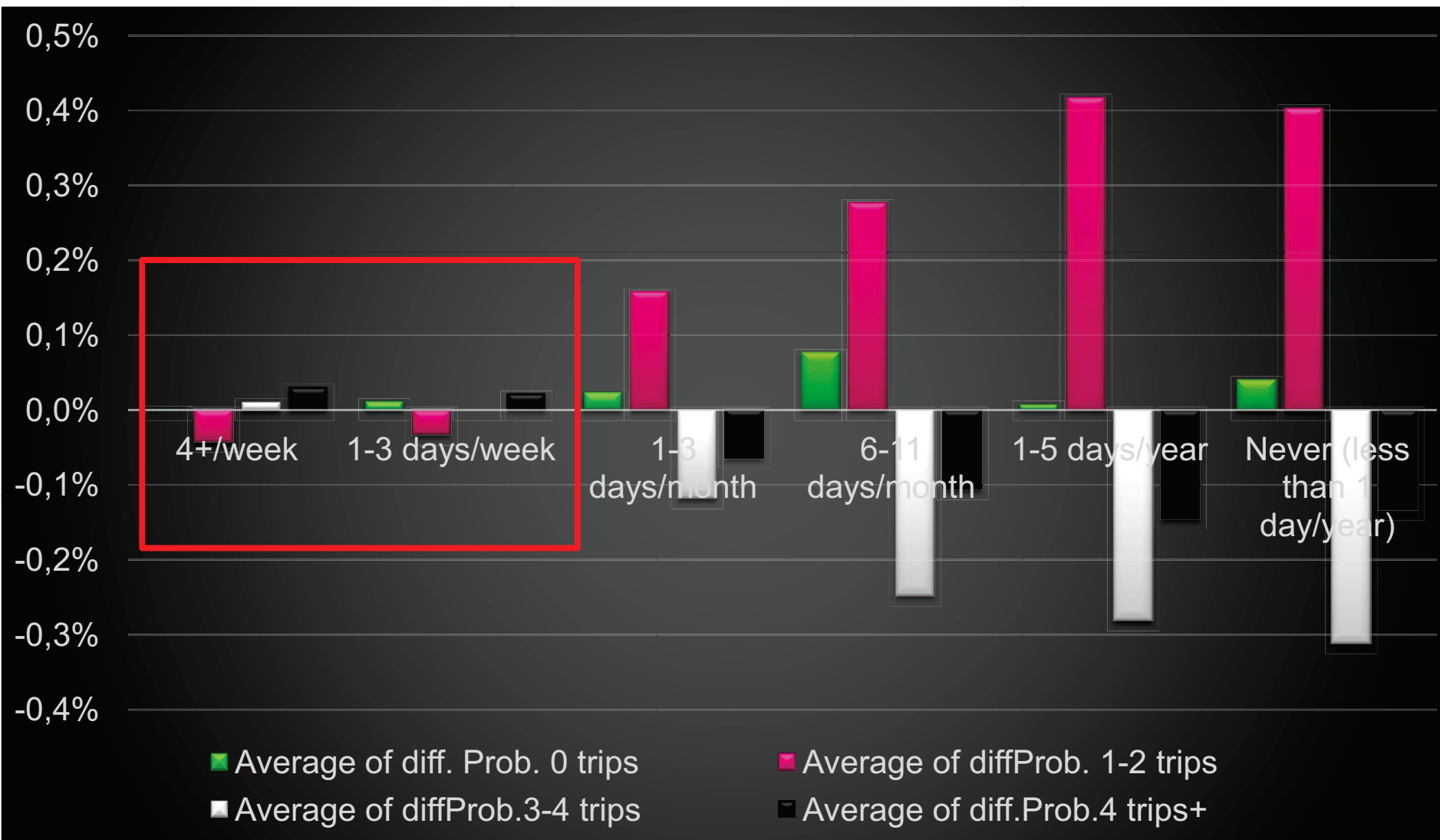
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Least reliable: 'teenagers'

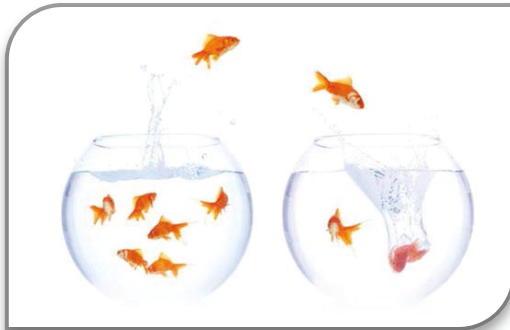
MOST RELIABLE: ADULTS 25-55 years old

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MOST RELIABLE: frequent car users

Applicability to demand models



1

Isolated attrition and completeness effects



2

Development of methodology for weighting



3

Specific attrition/mobility effects were identified

Future research

- In collaboration with Kim, Kennisinstituut voor Mobiliteit
- Integration of screening data and non-response model
 - VMT and Non-response

Our team



Lissy La Paix



Karst Geurs



Marie-José Olde-Kalter



Gracias