

OTM 8.0 Demand Model

Comprehensive Re-estimation and Methodological Advances for Greater Copenhagen

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25.08.2026



Vejdirektoratet

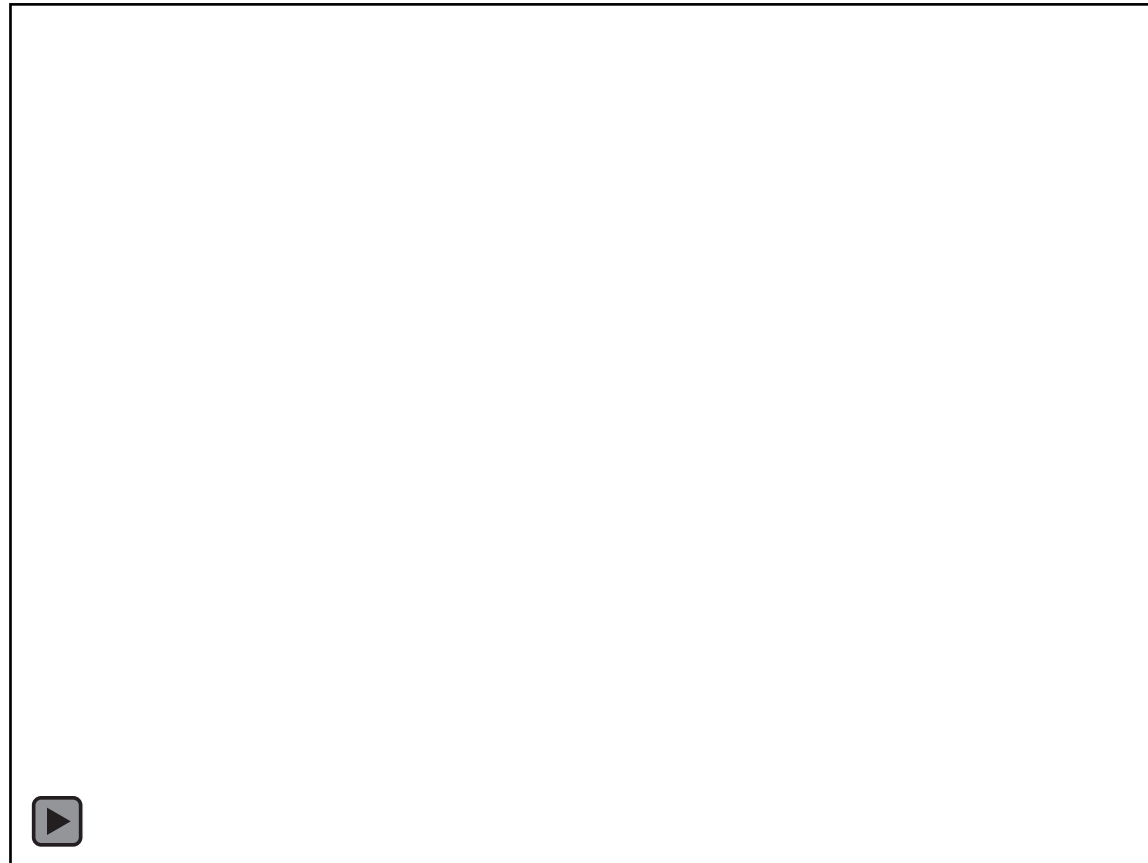


Agenda

- Introduction
- Motivation
- Structure of the models
- Main enhancements
- Data
- Results
- Final considerations

Introduction

OTM simulates **traffic on a typical day** in the Greater Copenhagen region under different scenarios.



Demand models

Travelling? Yes, No

How? Car, PT, bike, walk

Where? Destination

When? Time of the day

Motivation

Greater Copenhagen has moved a long way since OTM 7.1's 2015 base year: networks, costs, and travel patterns have all shifted, while policy attention has turned toward pricing.

01

Network & behavior change

Network expansions and evolving travel patterns since 2015 have altered how the region travels.

02

Cost & socioeconomic shifts

Travel costs and socioeconomic conditions have moved, requiring an updated behavioral base year.

03

Pricing policy focus

Growing interest in congestion charging, parking regulation, and sustainable-mobility measures.

04

Forecasting robustness

Planning needs a model that is both accurate today and a reliable base for appraisal.

Frequency models: new base year

Frequency models were re-estimated per purpose using the same sequential stop/go framework as OTM 7.1, with an open-ended final alternative for higher travel-demand levels.

Home-Work

Home-Business

Home-Education

Home-Shopping

Home-Other

NHB-Business

NHB-Other

- Parameters broadly consistent with OTM 7.1: stable behavioral relationships
- Principal contribution: shifting the behavioral base year from 2015 to 2023
- Main enhancements are concentrated in the mode-destination models

Mode-destination-time-of-day models

Seven purpose-specific models jointly represent mode, destination, and (for car drivers) time of day.

How?

Car driver SOV

Public transport

Car driver HOV

Bicycle

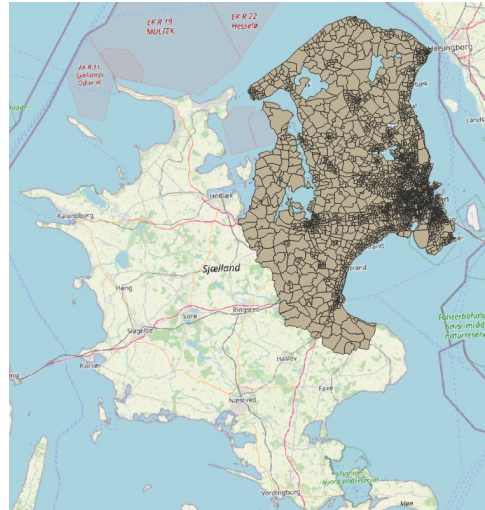
Car passenger

Walk

6

modes
(SOV / HOV split is new)

Where?



4,040

destination zones

When?

03:00 - 04:59

05:00 - 05:59

06:00 - 06:59

07:00 - 07:59

08:00 - 08:59

09:00 - 14:59

15:00 - 15:59

16:00 - 16:59

17:00 - 17:59

18:00 - 20:59

21:00 - 02:59

11

time periods

Main enhancements in OTM 8.0

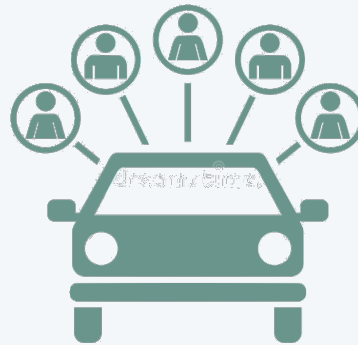
01

Car driver mode split



02

Car cost-sharing revision



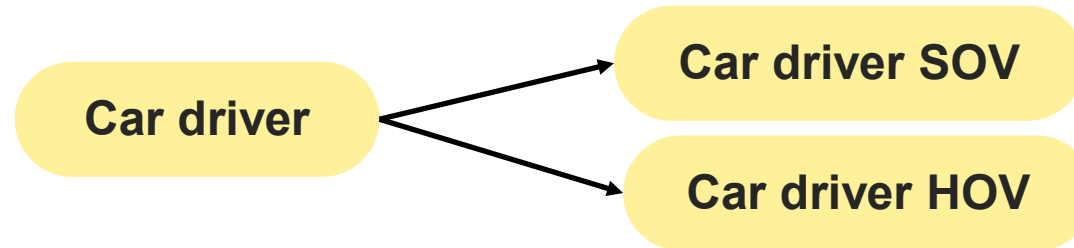
03

Public transport representation



Splitting car driver into SOV and HOV

OTM 7.1 represented all car drivers with a single alternative, masking real differences between driving alone and driving with passengers. OTM 8.0 separates the two, improving travel-time valuation, cost sensitivity, and mode-substitution realism.



Purpose-specific model	Number of mode-destination alternatives	
	OTM 7.1	OTM 8.0
Home-Work	158.886 (35 TP combinations*)	298.960 (35 TP combinations)
Home-Business	118.146 (25 TP combinations)	210.080 (24 TP combinations)
Home-Education (NL)	92.920 (19 TP combinations)	153.520 (17 TP combinations)
Home-Shopping (NL)	134.442 (29 TP combinations)	177.760 (20 TP combinations)
Home-Other (NL)	203.700 (46 TP combinations)	282.800 (33 TP combinations)
NHB-Business	61.110 (11 TP combinations)	105.040 (11 TP combinations)
NHB-Other	61.100 (11 TP combinations)	105.040 (11 TP combinations)

*TP combinations refer to time period combinations considered for time-of-day choice for car drivers

Car cost-sharing revision

OTM 7.1 allocated costs by observed party size, so when the observed choice is solo driving, the car-passenger alternative effectively receives a zero travel cost, inflating the modelled shift to car-passenger travel. OTM 8.0 uses purpose-specific average HOV occupancy instead.

Why it matters

Removes the unrealistic zero-cost passenger alternative and produces credible responses, directly strengthening congestion-charging and parking-pricing appraisal.

2.24 – 2.66

*average persons per HOV vehicle,
by purpose*

Public transport representation

Generalized public transport time

PT level of service is now a single generalized travel time in bus-equivalent minutes, combining in-vehicle time, access/egress, waiting and transfer penalties, and bike-and-ride / bike-on-board options. This ensures consistency between route choice and demand modelling.

In-vehicle time

Access & egress

Wait & transfer penalties

Bike-and-ride / bike-on-board

Distance-correction terms

New distance-correction terms were added to enhance replication of observed tour-length distributions across modes, particularly for public transport trip lengths, which previous versions under-represented.

Data

National Travel Survey (TU)

30,000+

tours & trips, 7 purposes

Waves 2016–2019 and 2022–2025;
standardized preprocessing for tour
reconstruction, purpose/mode hierarchy,
and 11 OTM time periods.

Level-of-service data

2023

base-year network

Car LoS split by SOV/HOV; public
transport represented as generalized bus-
equivalent travel times; walk & cycle by
distance.

Zonal attraction data

4,040

OTM zones

Purpose-specific size variables:
employment, study places, retail
floorspace, and population, consistent with
OTM 7.1.

Results: Mode Shares

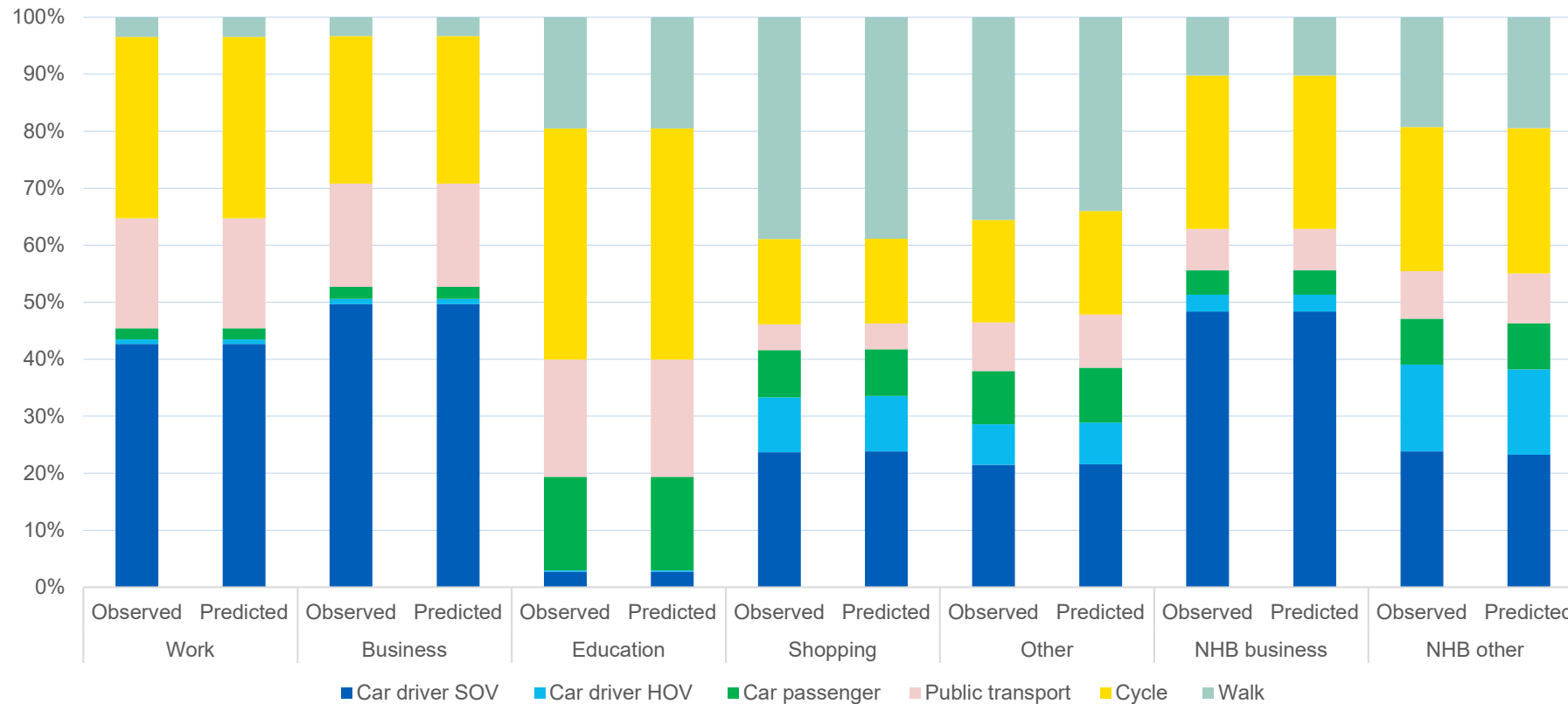


Figure 1 - Observed versus Predicted Mode Shares in OTM 8.0

Results: Trip-Length Distributions for Work Tours

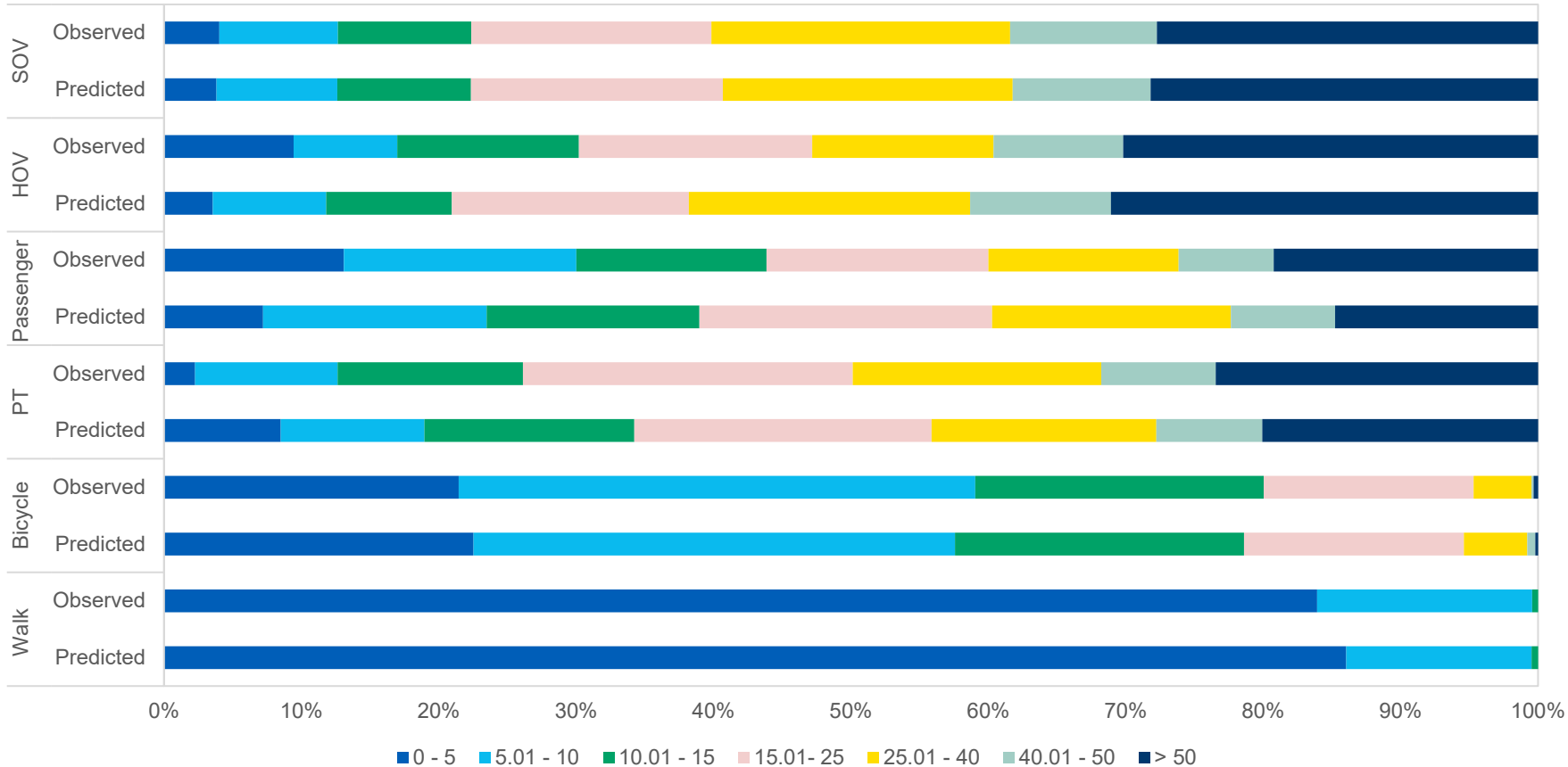


Figure 2 - Observed and Predicted Trip-Length Distributions by Mode for Work Tours (km)

Results: Trip-Length Distributions for Education Tours

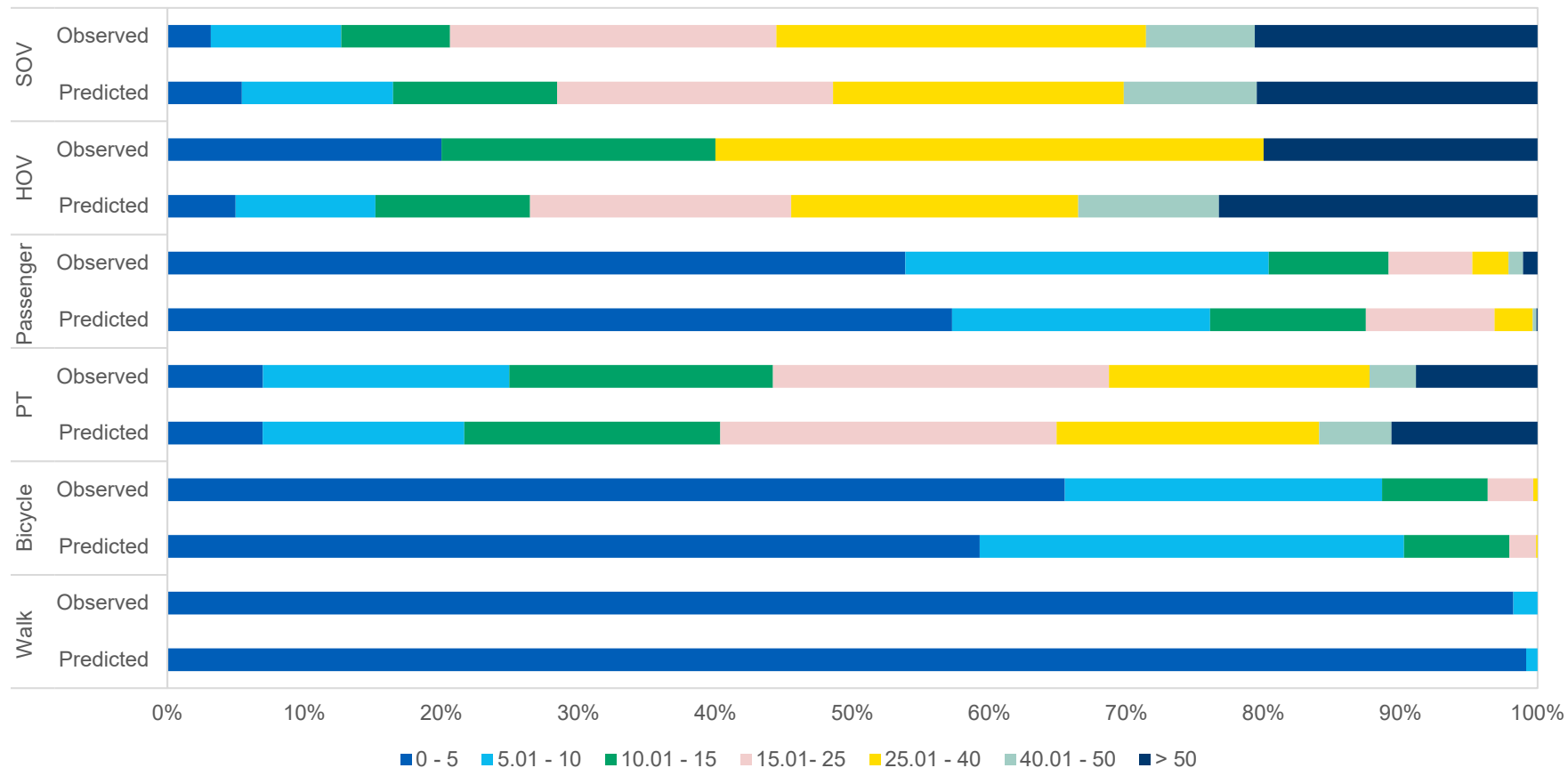
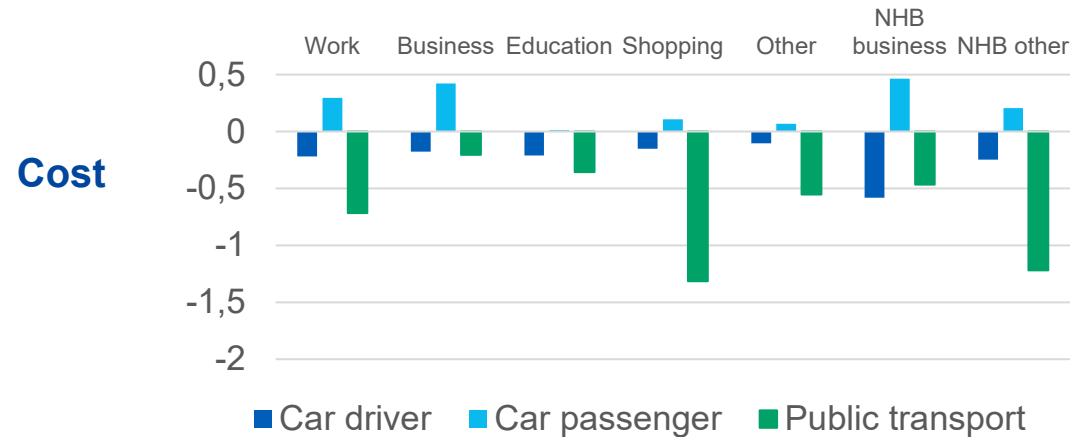


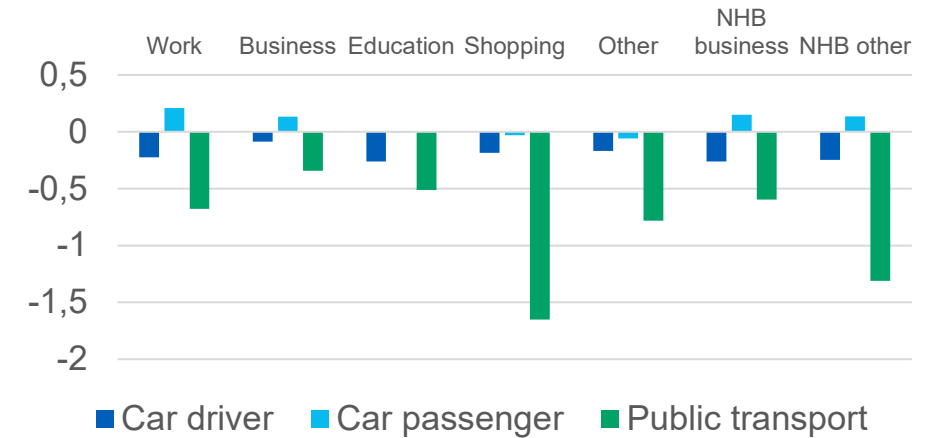
Figure 3 - Observed and Predicted Trip-Length Distributions by Mode for Education Tours (km)

Results: OTM 7.1 vs OTM 8 elasticities

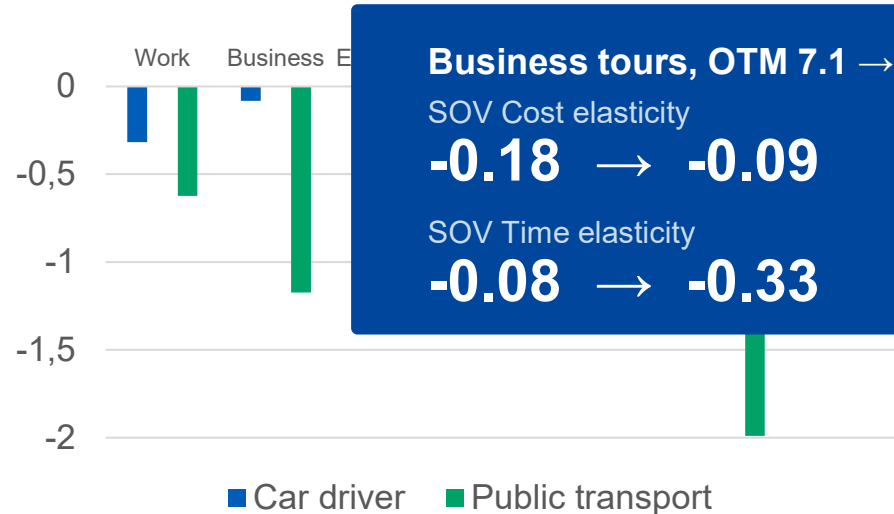
OTM 7.1



OTM 8



Time

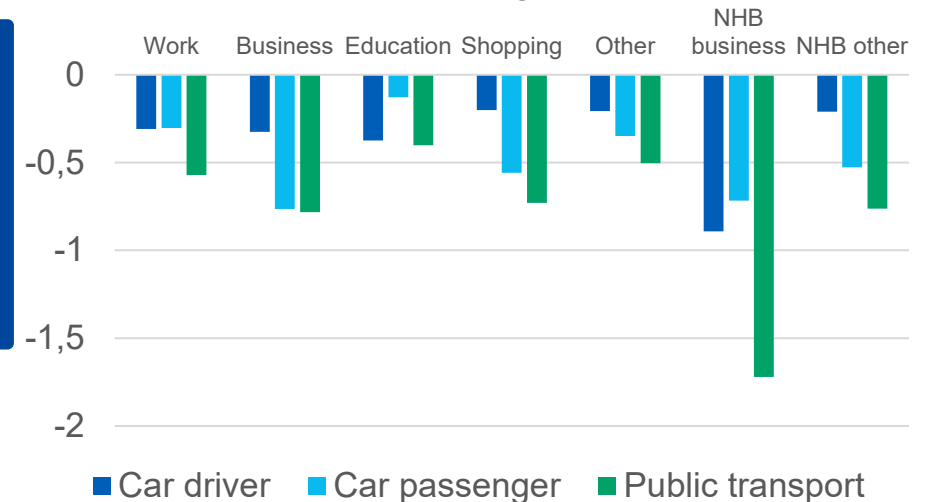


Business tours, OTM 7.1 → 8.0

SOV Cost elasticity

-0.18 → -0.09

SOV Time elasticity

-0.08 → -0.33



Results: OTM 8 cost elasticities

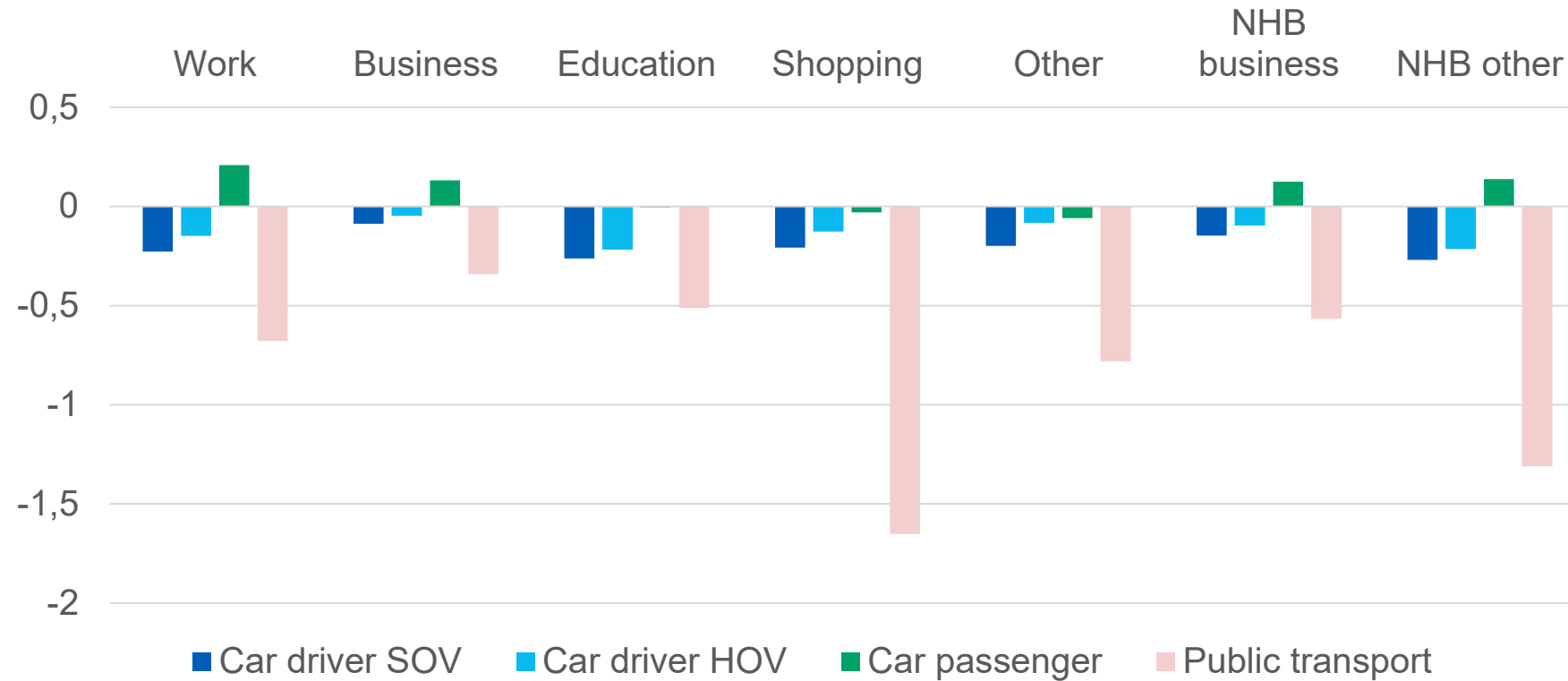


Figure 4 – OTM 8 cost elasticities

Final considerations

- OTM 8 represents a stronger foundation for the Greater Copenhagen's transport future
- Behavioral realism improved without sacrificing predictive accuracy
- Car driver SOV/HOV split & revised cost sharing sharpen pricing-policy sensitivity
- Consistent PT representation and better trip-length replication strengthens appraisal of PT investments



Tak!

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