Elasticities with paneldata

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Intro to the topic

- **At present (cost) elasticities are based on:**
  - Cross section RP data, Longitudinal data, SP survey's or aggregated time series data
  - Usually with use of models
- **It is expected that estimates of elasticities could be improved using MPN**
- **Panel data would be preferred:**
  - Accounting for individual changes over time
  - Accounting for other influences on changes in mobility behavior

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Panel data used

- Analyses took place on the trip level
- All data for 4 waves 2013-2016 were merged in one datafile
- All trips during the 3 days diaries
- In total almost 9.000 respondents with questionnaires and diaries
- More than 150.000 trips

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Derivation of travel costs

- For used and non used travel modes
- For car driver and passenger
- For train and BTM
- Actual changes over time period 2013-2016

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Derivation of travel costs: car

- **If car was used:**
  - Reported travel distance
  - Based on RDW: fuel efficiency for urban and non urban trips
  - Based on CBS: fuel prices per month
  - Accounting for reimbursement for work related trips

- **Issues**
  - No information which car is used in multi car households
  - No route information
  - Fuel efficiency not very accurate
  - No information where fuel is bought
  - Exact re-imbursement not known

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Derivation of travel costs: car

- **If car was not used:**
  - Estimated travel distance based on 6 digit postal codes and route information (Trip-cast)
  - Estimation of travel costs same as before

- **Issues**
  - Sometimes missing values postal codes
  - Same issues as before

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Derivation of travel costs: public transport

- **If public transport was used:**
  - Reported travel distance
  - Separate for train and BTM
  - Based on DOVA/NS: costs per km/tariefeenheid for each region
  - Accounting for reimbursement for work related trips
  - Accounting for reduction with travel cards
- **Issues**
  - People travel between regions
  - Exact price paid not known
  - Levels of reimbursement and fare reduction are based on expert opinion

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Derivation of travel costs: public transport

- **If public transport was not used:**
  - Estimation of travel distance using the open trip planner, using 6 digital postal codes
  - Estimation of travel costs same as before

- **Issues**
  - Sometimes missing values postal codes
  - Same issues as before

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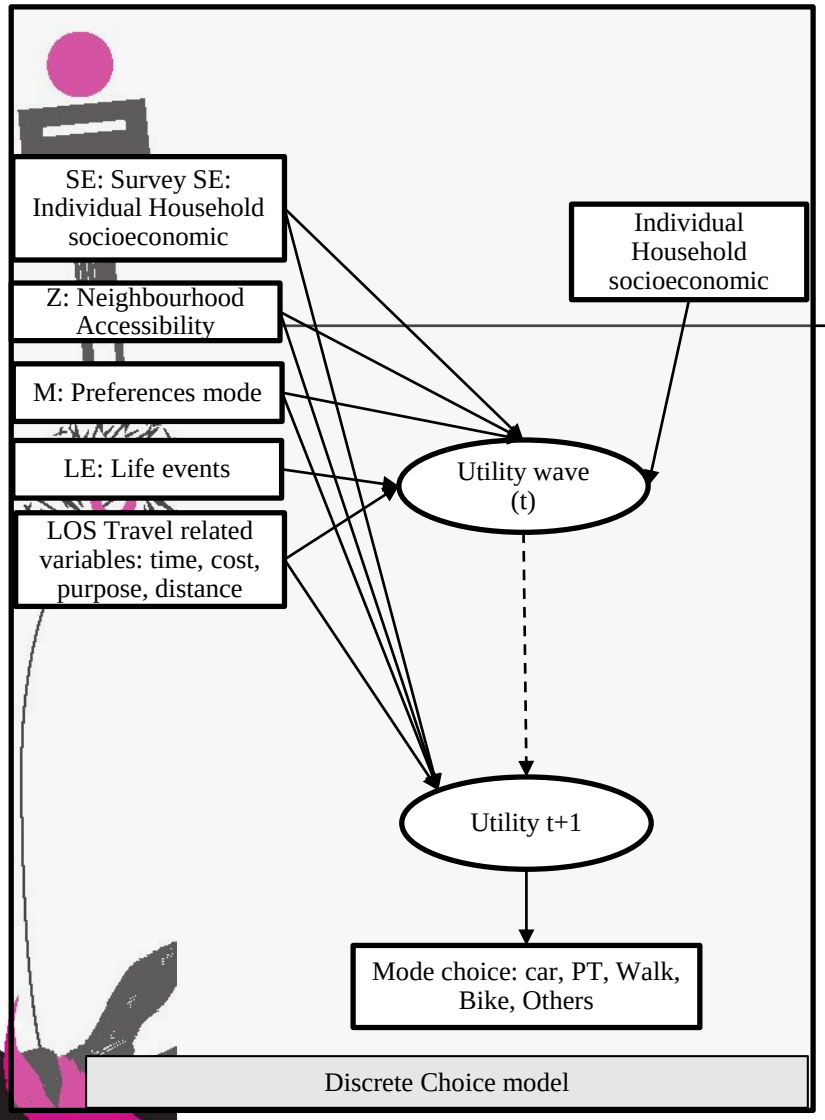
Derivation of travel costs summary

- **General**
  - For almost all trips travel costs could be derived
  - For chosen and non chosen alternatives
  - For car driver, car passenger, train and BTM
  - Not for bicycle and walking

- **Main issues**
  - Missing values because:
    - Not known which car is used
    - Missing info about fuel efficiency
    - Missing postal codes
  - Re-imbursement not known with enough detail

Model Framework

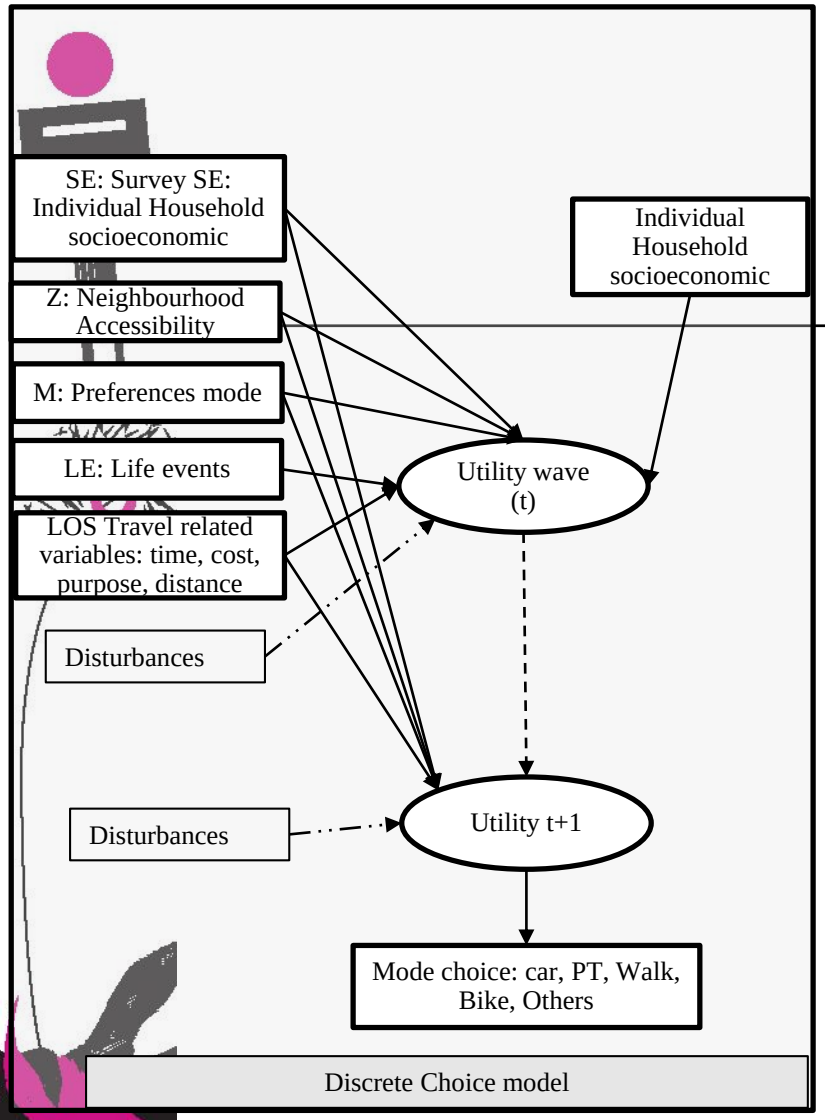


Notation

- Observable variable
- Unobservable variable
- Structural relationship
- Measurement relationship
- Disturbances

Model 1

Model Framework



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Model 2

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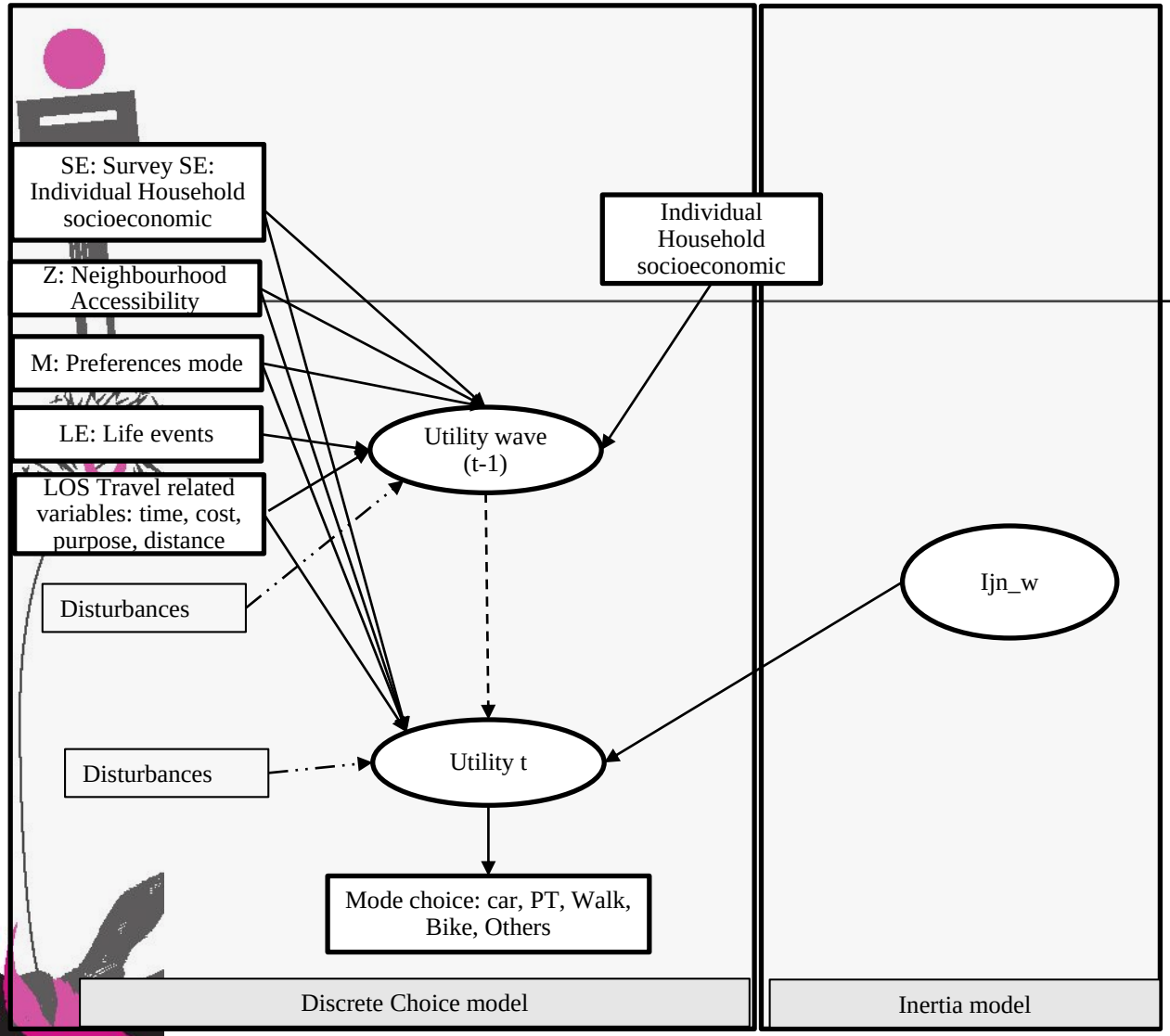
Model Framework



Notation

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Model 3

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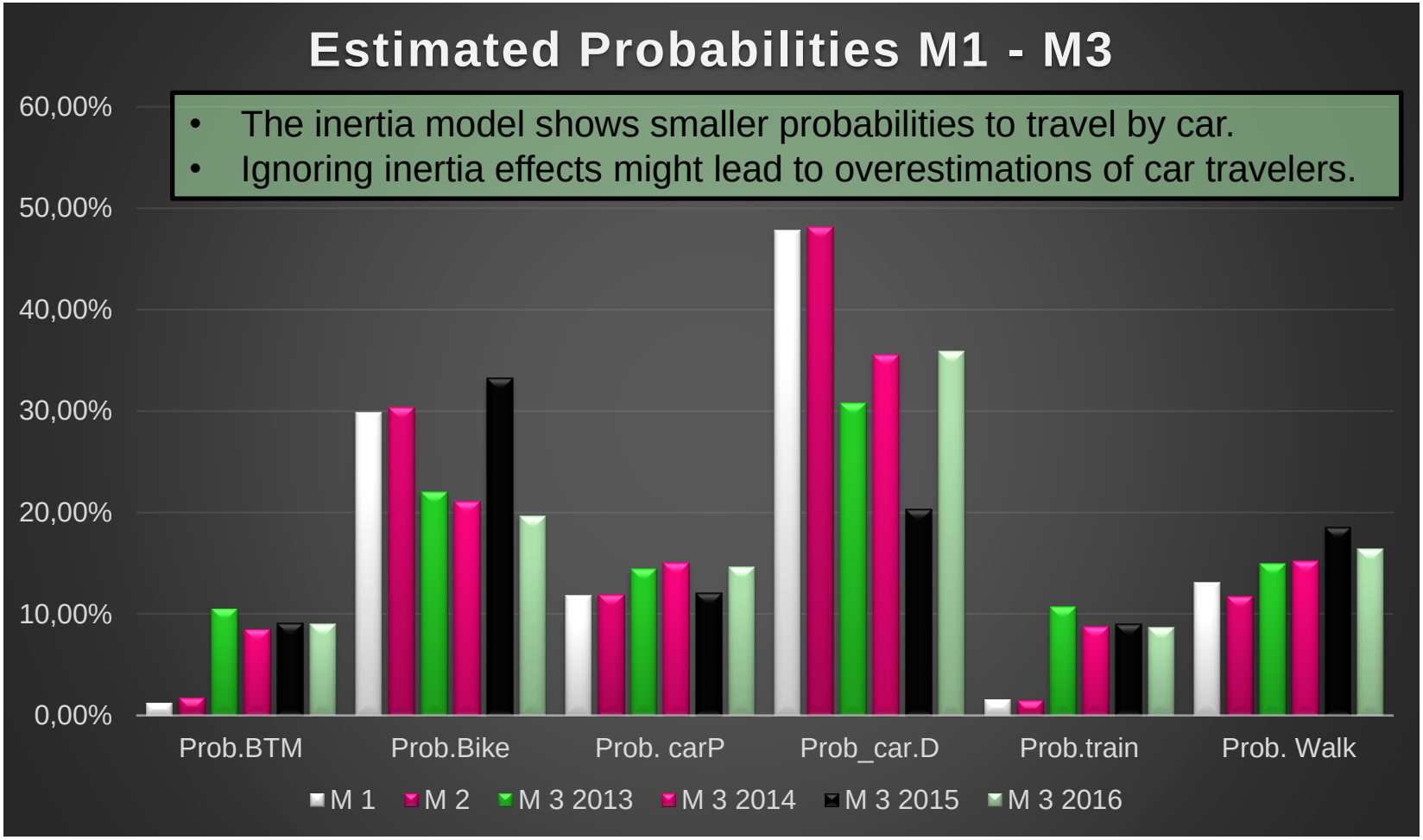
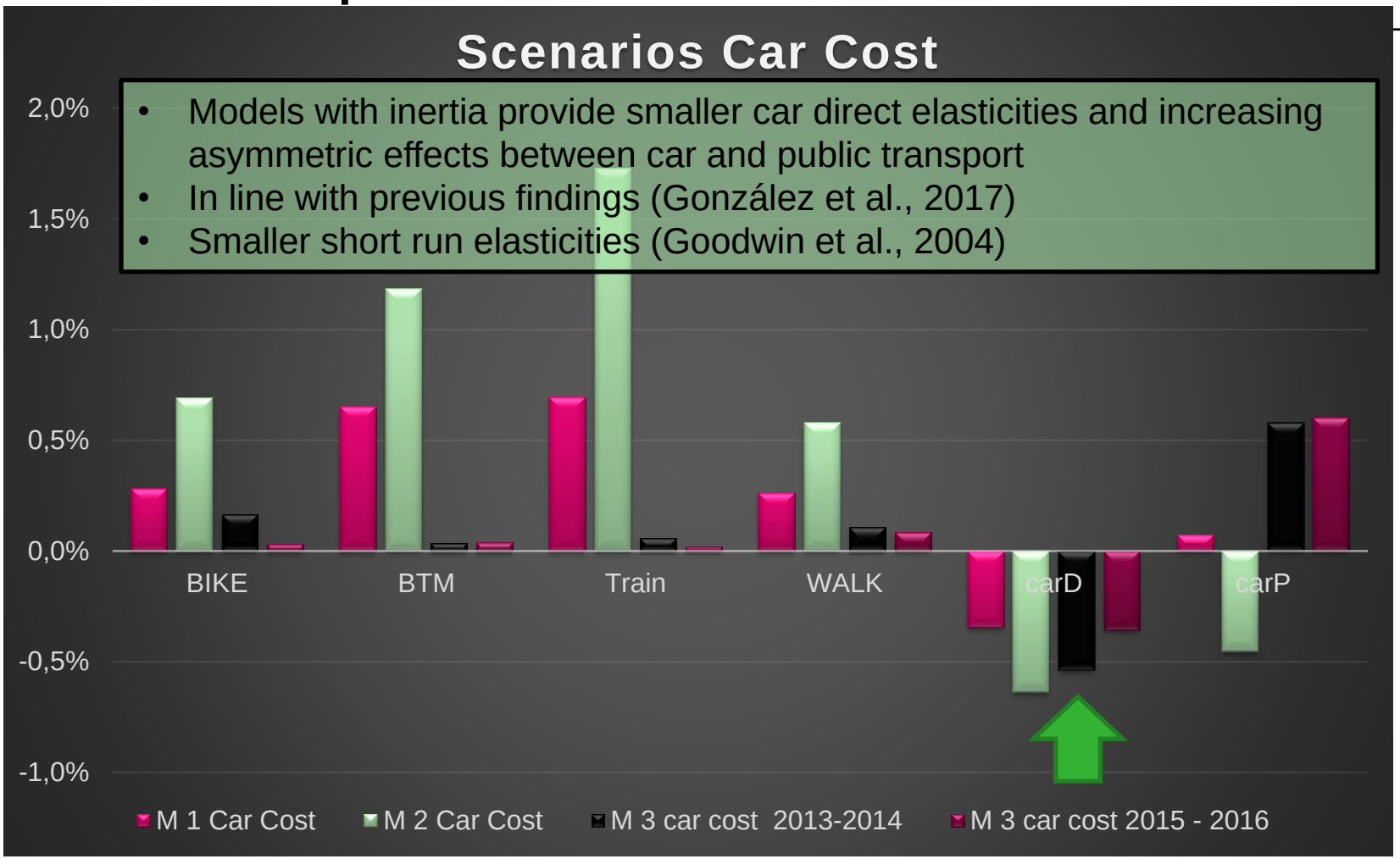
Results and Elasticities



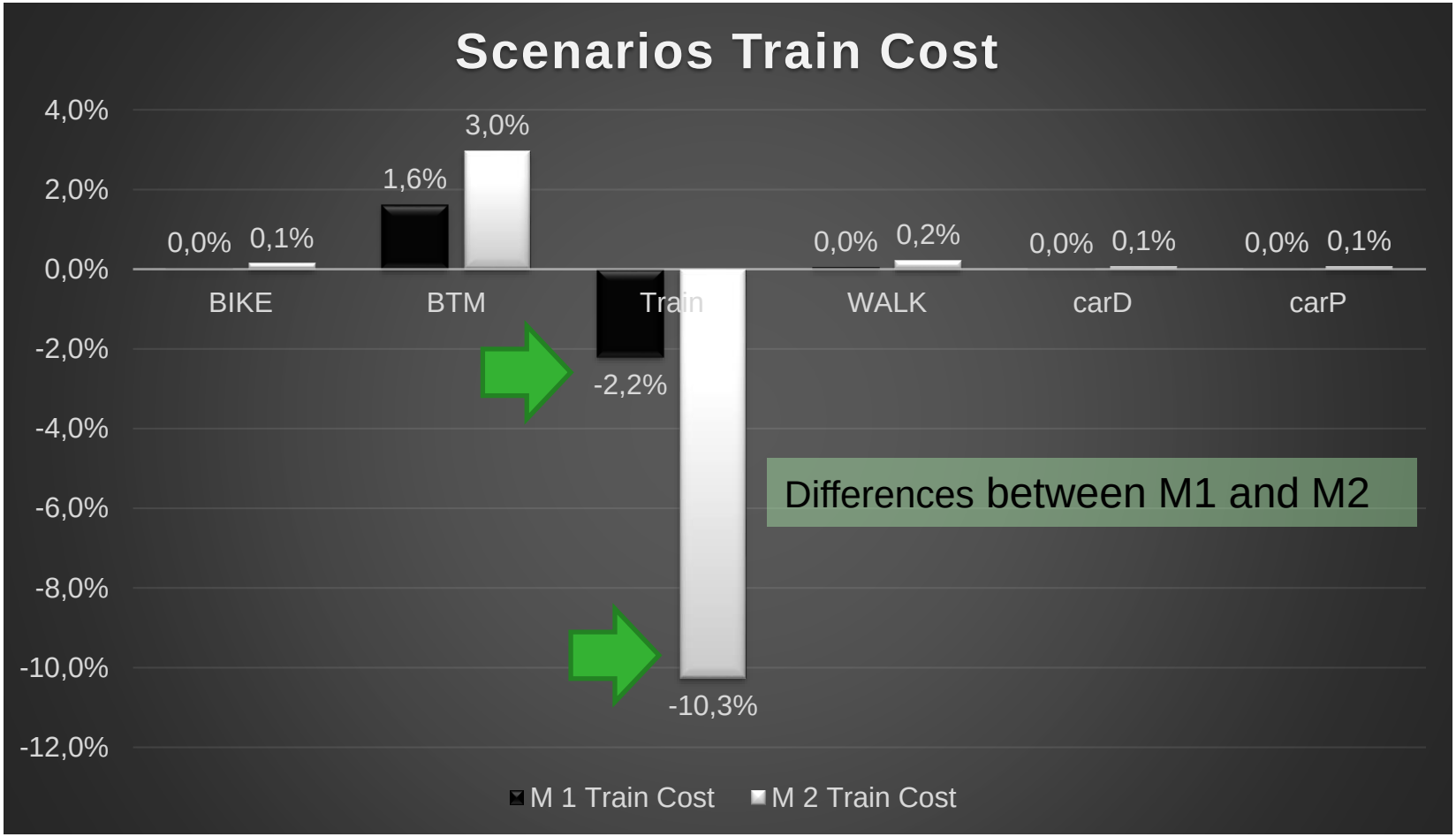
- The inertia model shows smaller probabilities to travel by car.
- Ignoring inertia effects might lead to overestimations of car travelers.

Results and trip Elasticities

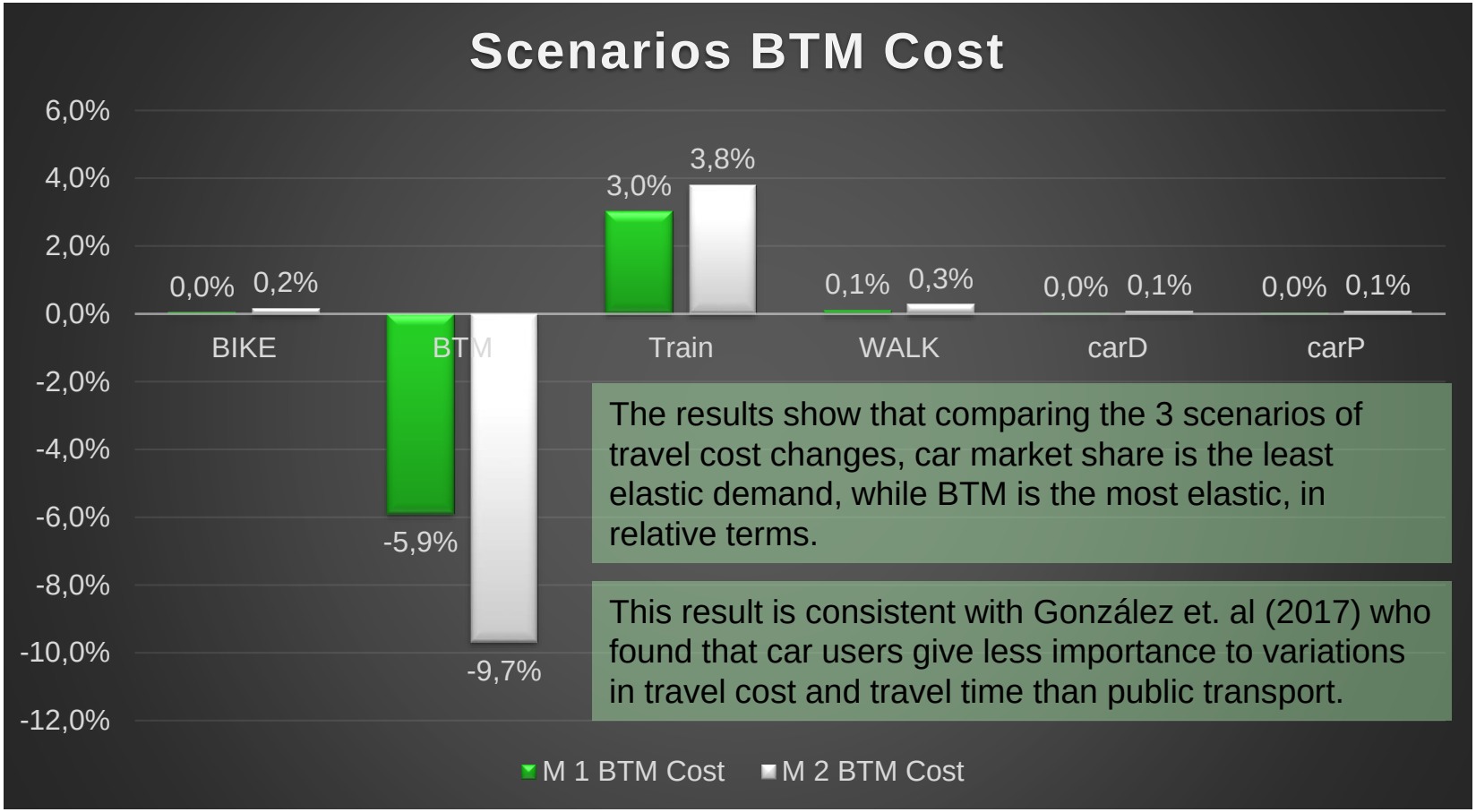


- Models with inertia provide smaller car direct elasticities and increasing asymmetric effects between car and public transport
- In line with previous findings (González et al., 2017)
- Smaller short run elasticities (Goodwin et al., 2004)

Results and trip Elasticities



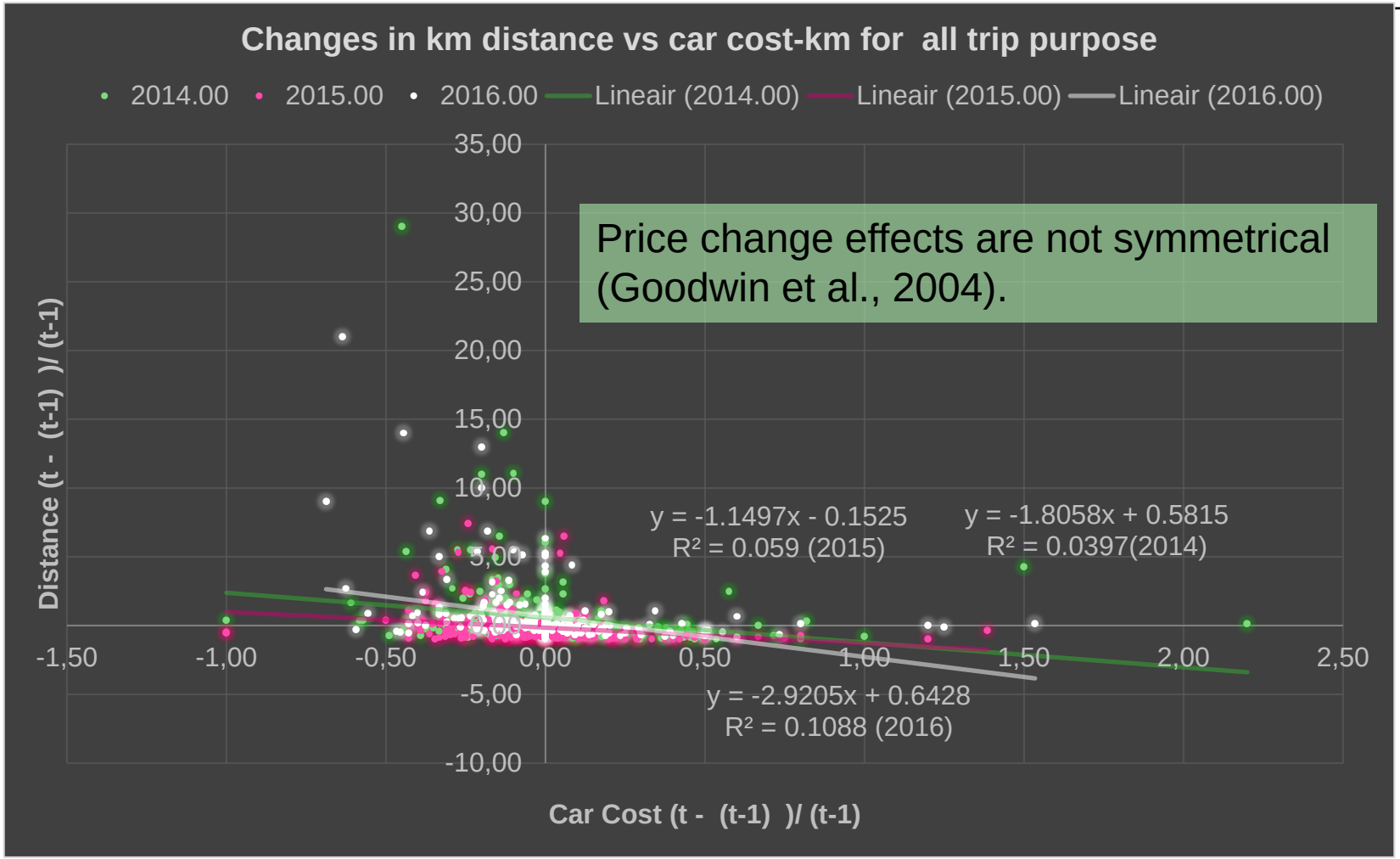
Results and trip Elasticities



The results show that comparing the 3 scenarios of travel cost changes, car market share is the least elastic demand, while BTM is the most elastic, in relative terms.

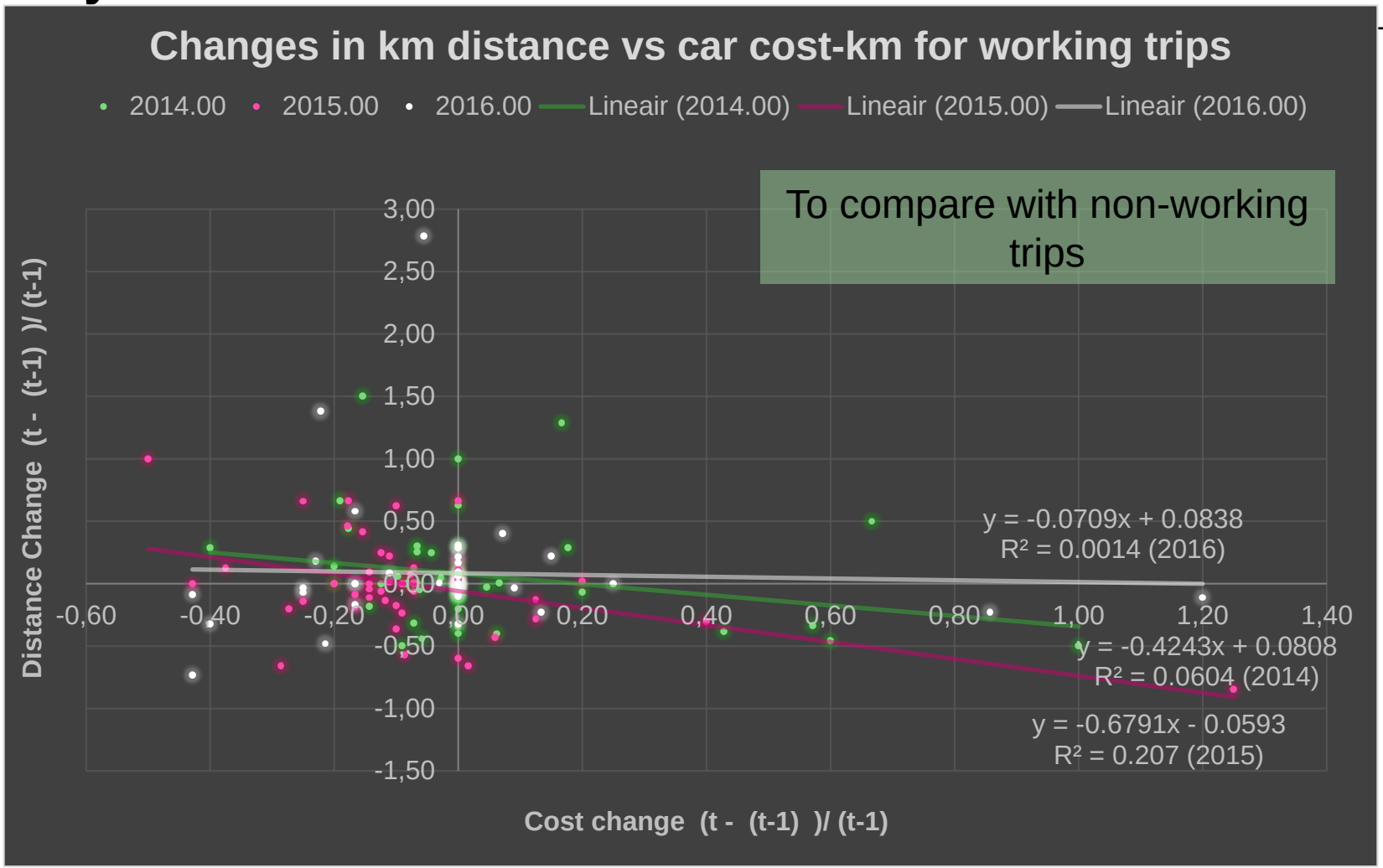
This result is consistent with González et. al (2017) who found that car users give less importance to variations in travel cost and travel time than public transport.

Results and trip Elasticities
Stayers car users

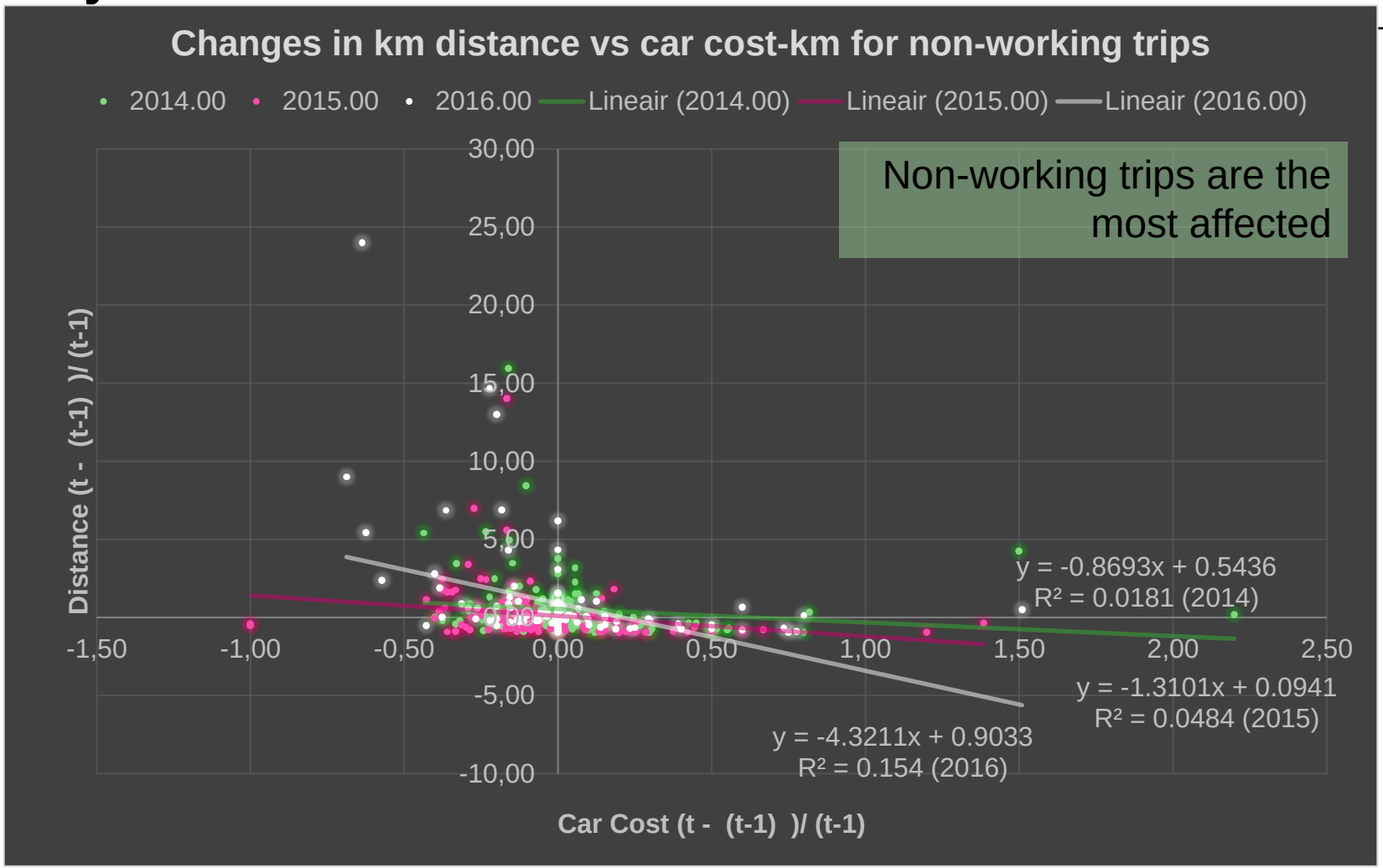


Price change effects are not symmetrical (Goodwin et al., 2004).

Results and Elasticities
Stayers car users



Results and Elasticities
Stayers car users

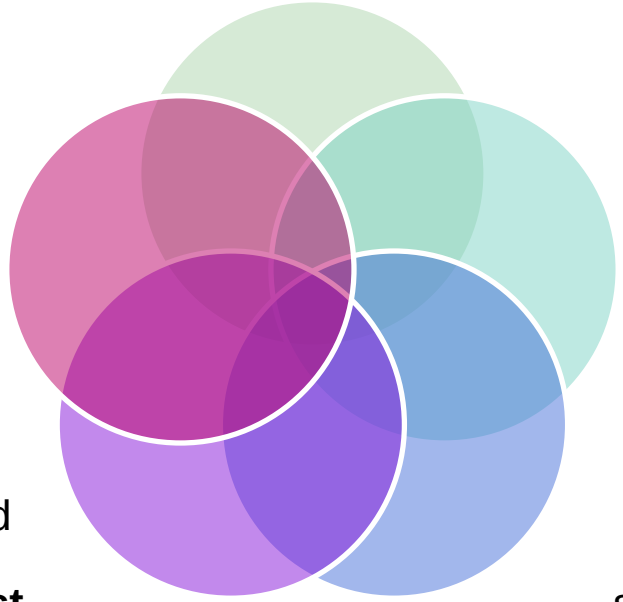


Conclusions

Panel effects are significantly relevant for modelling mode choice;

- Relevance of enriching panel data (MPN)

Elasticities of BTM cost are larger than train costs, and also larger than car costs.



Inertia effects substantially vary across transport modes; and impact cost elasticities

- Ignoring inertia effects might lead to overestimations of car travelers

The km travelled of non-working trips are the **most** affected

Car users and cyclists are the significantly inert travelers

Relevance and future research

- From the policy point of view, inertia models can be useful to test new transport services (Yanez et al., 2009).
- Analysis of repeated behavior or lagged variables plus inertia components (Cherchi et al., 2013)

References

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Thanks!

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