Do shared e-scooter services cause traffic accidents? Evidence from six European countries

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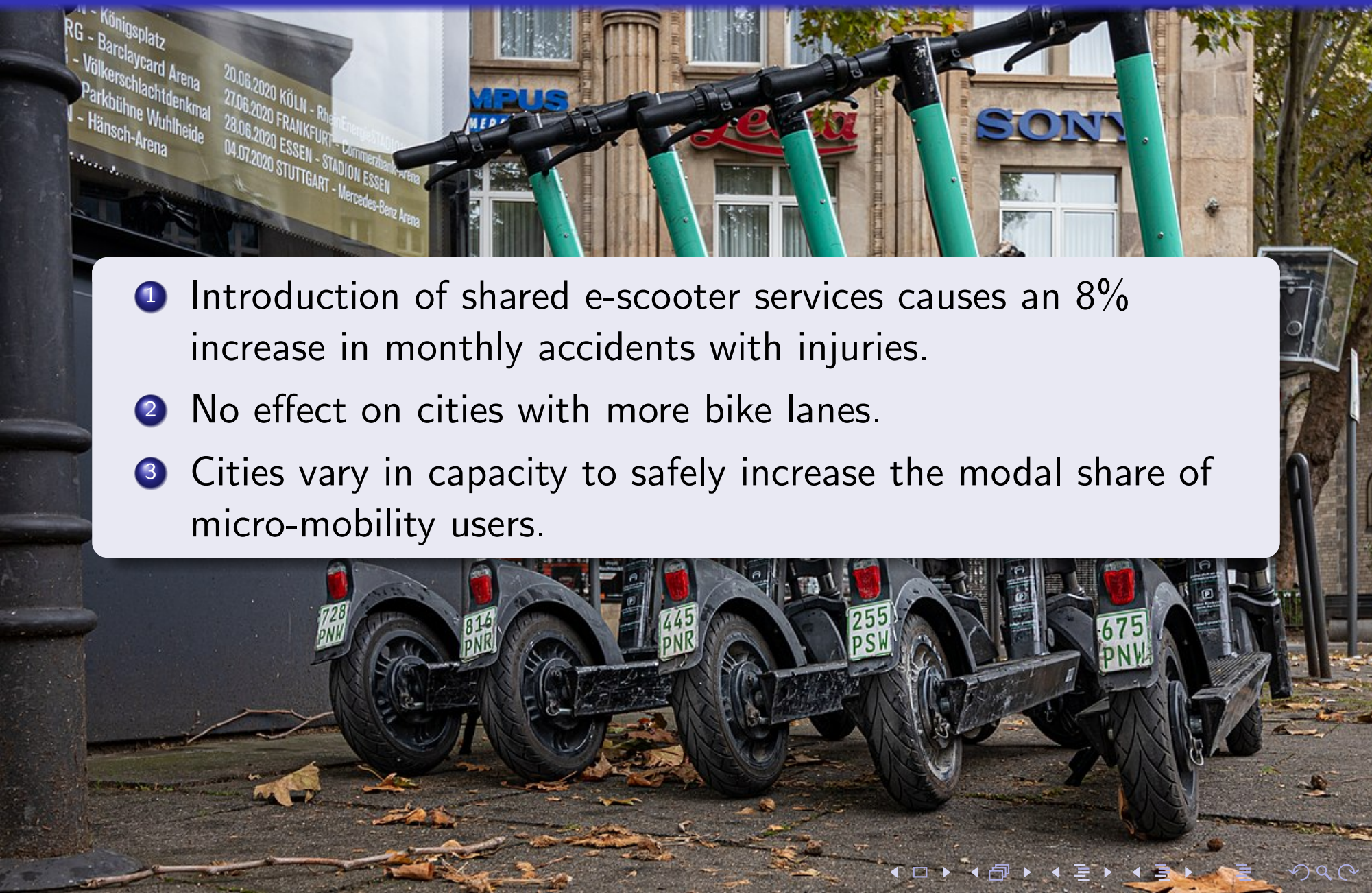
Findings



1. Introduction of shared e-scooter services causes an 8% increase in monthly accidents with injuries.
2. No effect on cities with more bike lanes.
3. Cities vary in capacity to safely increase the modal share of micro-mobility users.

Motivation

- Accidents are expensive and a deterrent.
- Introduction of shared e-scooter services uniquely identifiable shock increase to micromobility mobile share.
- Pan-European Master Plan for Cycling aims to increase modal share.

Data: Shared e-scooter service launch date

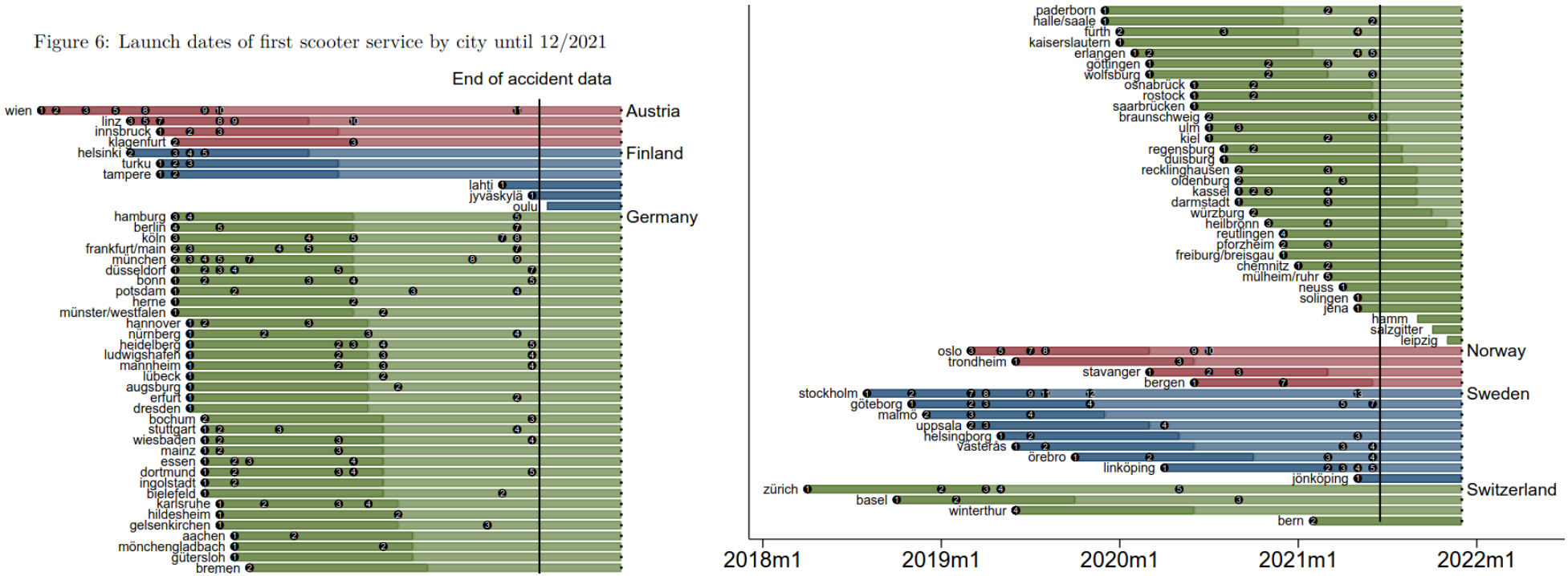


Figure 6: Launch dates of first scooter service by city until 12/2021

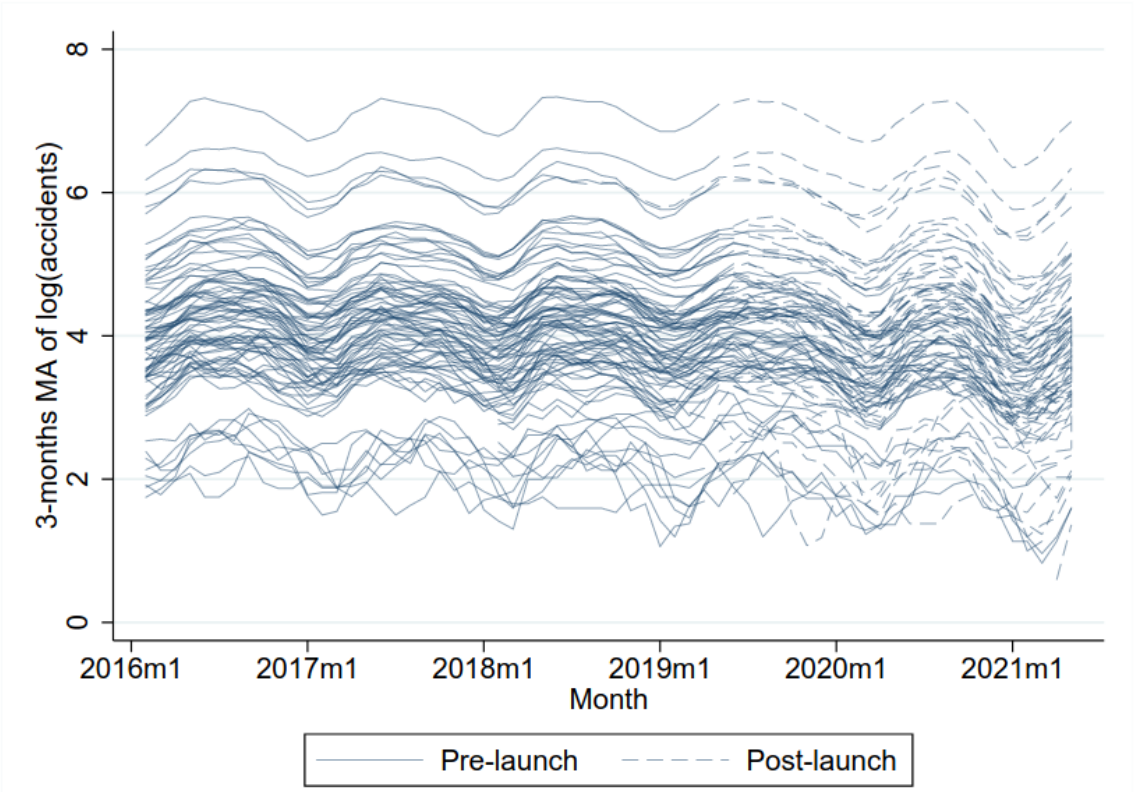
- All 93 cities in 6 European Countries.
- Quasi-random staggered treatment, Jan 2018-Jun 2021.

Outcome data: Traffic accidents with personal injury

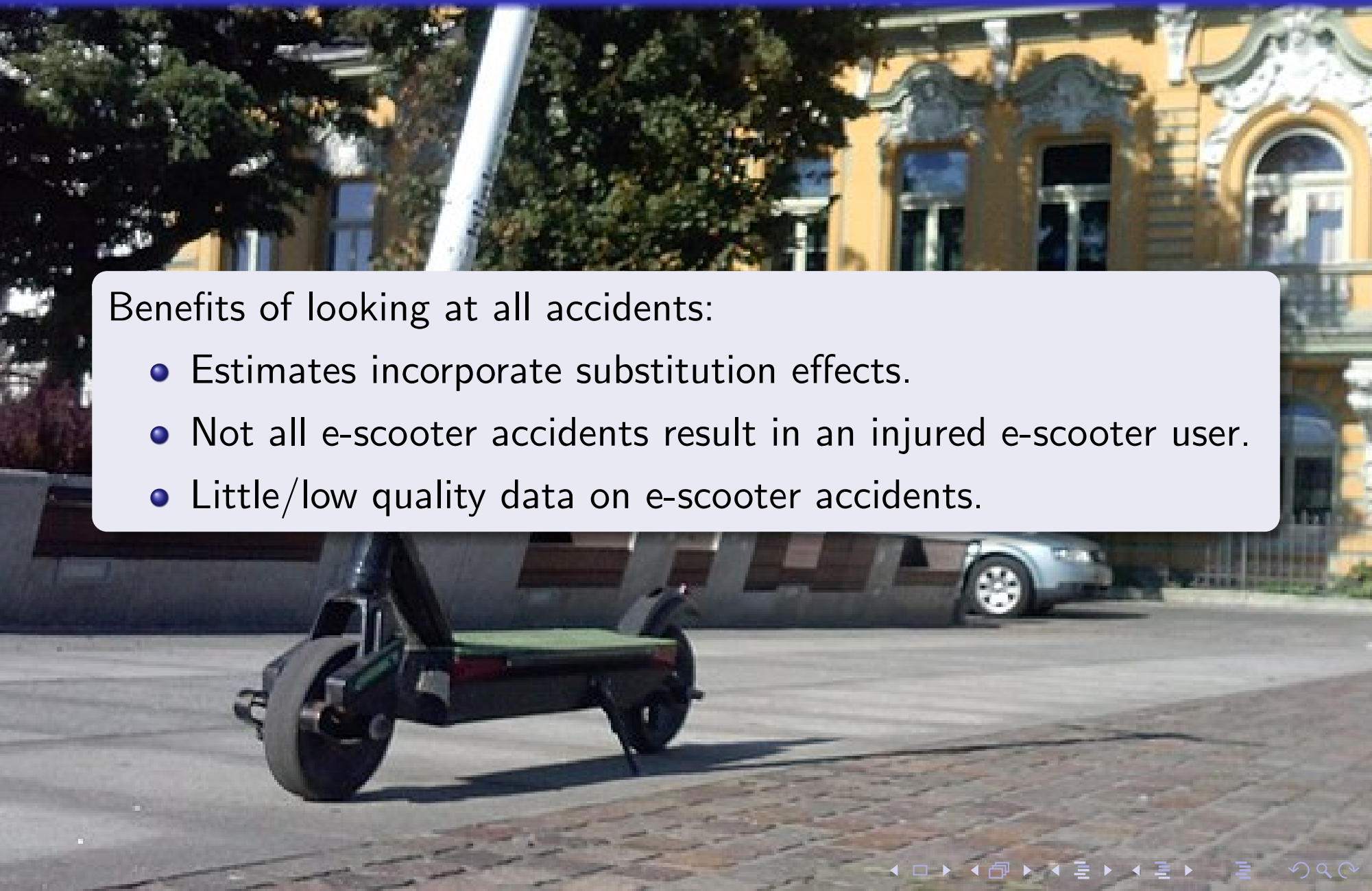
- Monthly city police reported accidents.
- Must involve a moving vehicle and personal injuries.

Figure: Monthly city accidents over time

Figure 4: After applying the natural logarithm, the seasonality in accident numbers runs parallel.



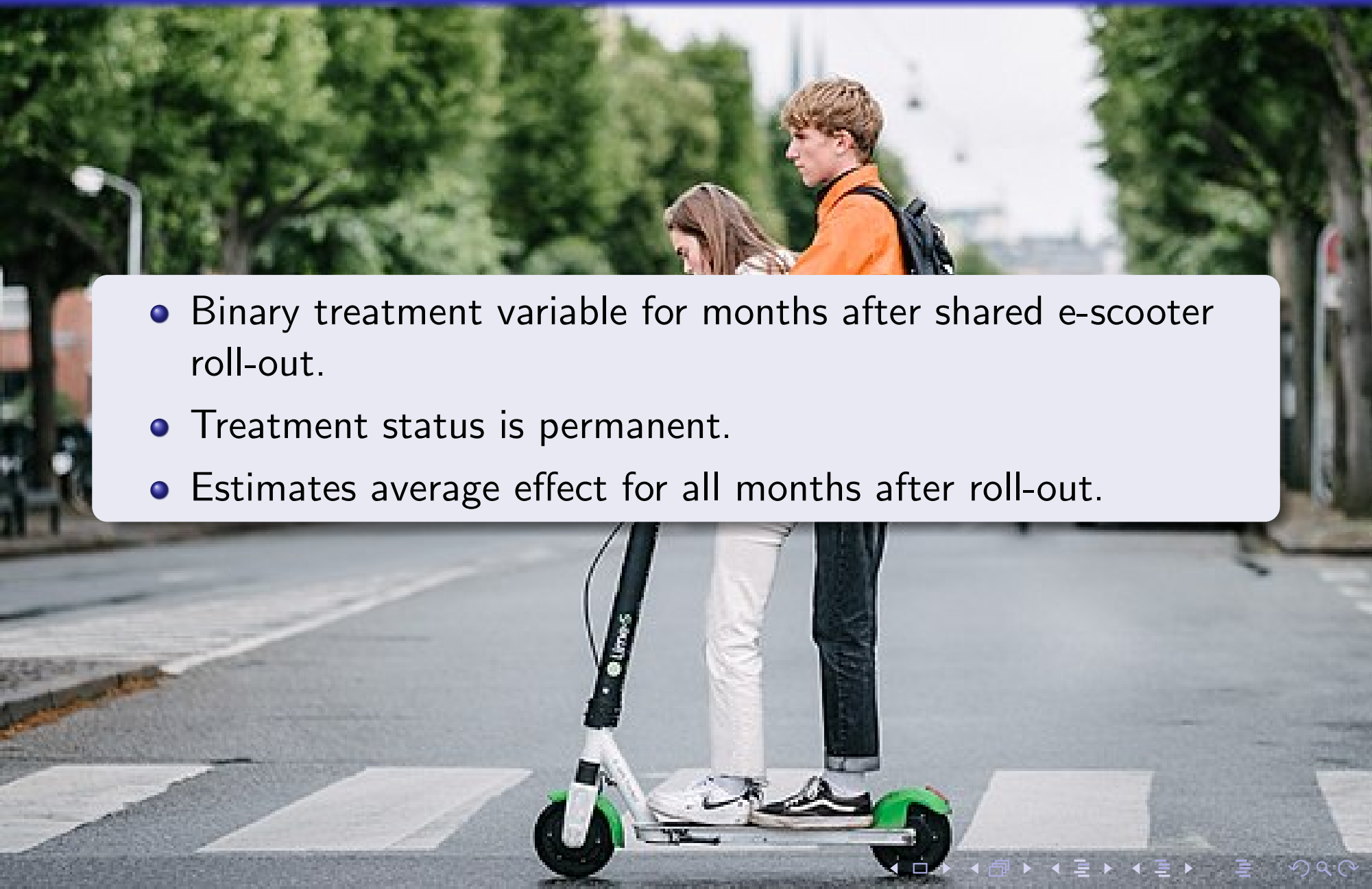
Outcome data: Traffic accidents with personal injury



Benefits of looking at all accidents:

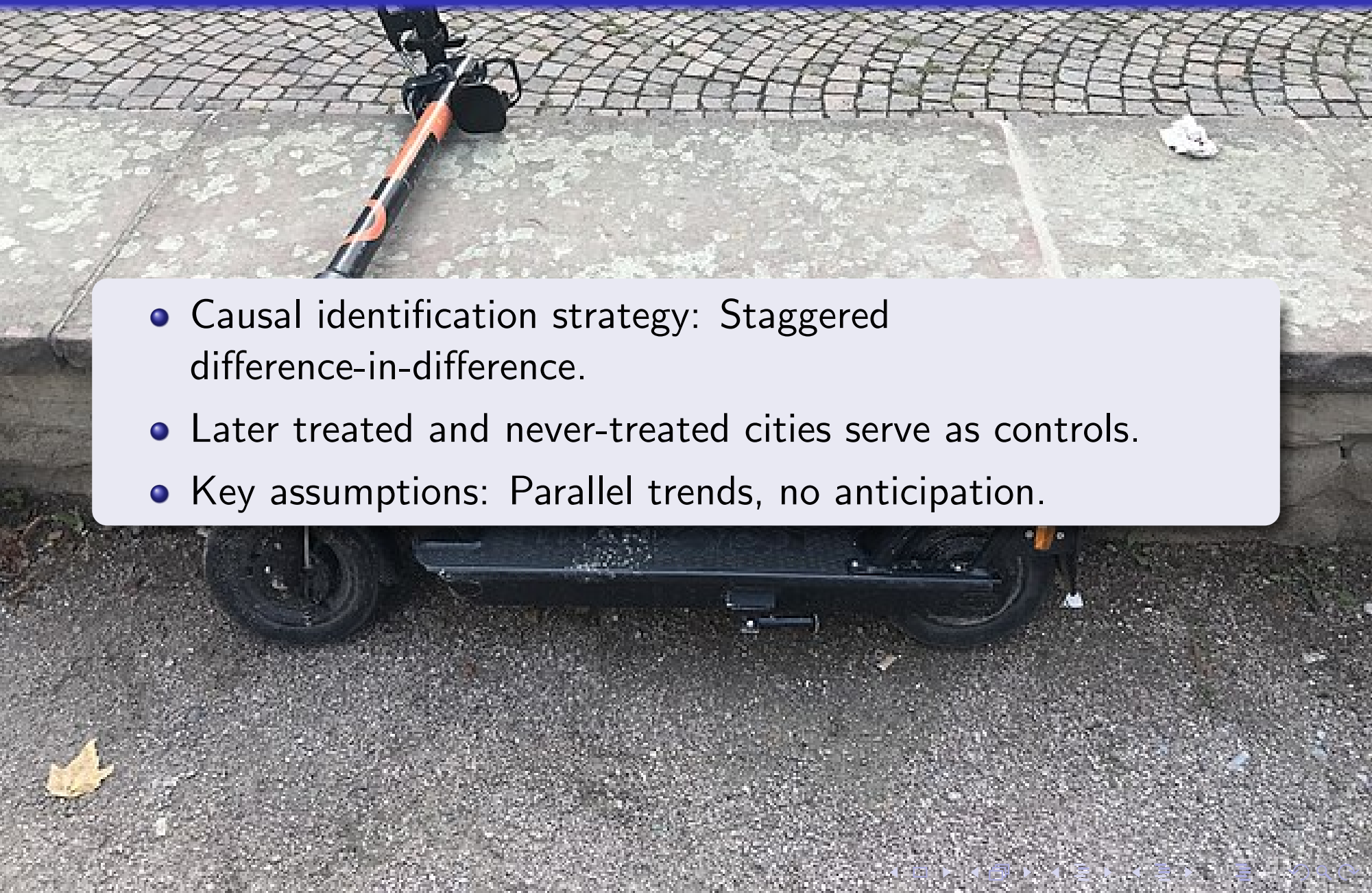
- Estimates incorporate substitution effects.
- Not all e-scooter accidents result in an injured e-scooter user.
- Little/low quality data on e-scooter accidents.

Treatment definition



- Binary treatment variable for months after shared e-scooter roll-out.
- Treatment status is permanent.
- Estimates average effect for all months after roll-out.

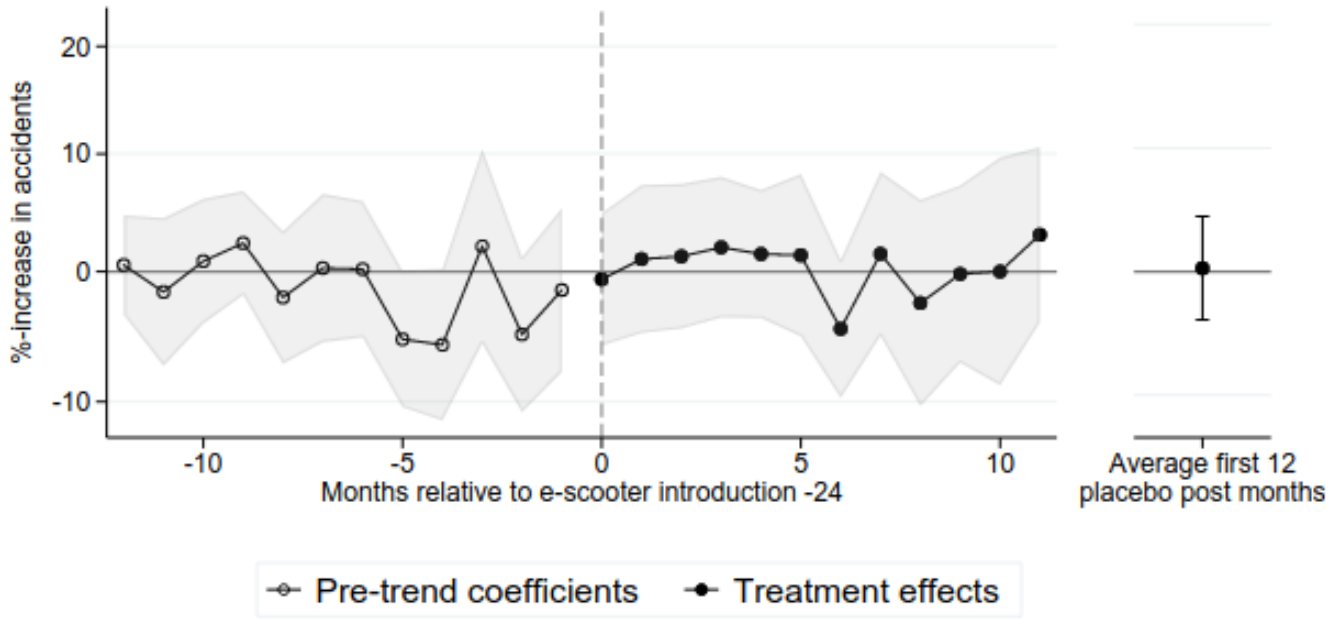
Empirical setup



- Causal identification strategy: Staggered difference-in-difference.
- Later treated and never-treated cities serve as controls.
- Key assumptions: Parallel trends, no anticipation.

Testing parallel trends

Figure: Placebo tests using treatment dates shifted by 24 months.

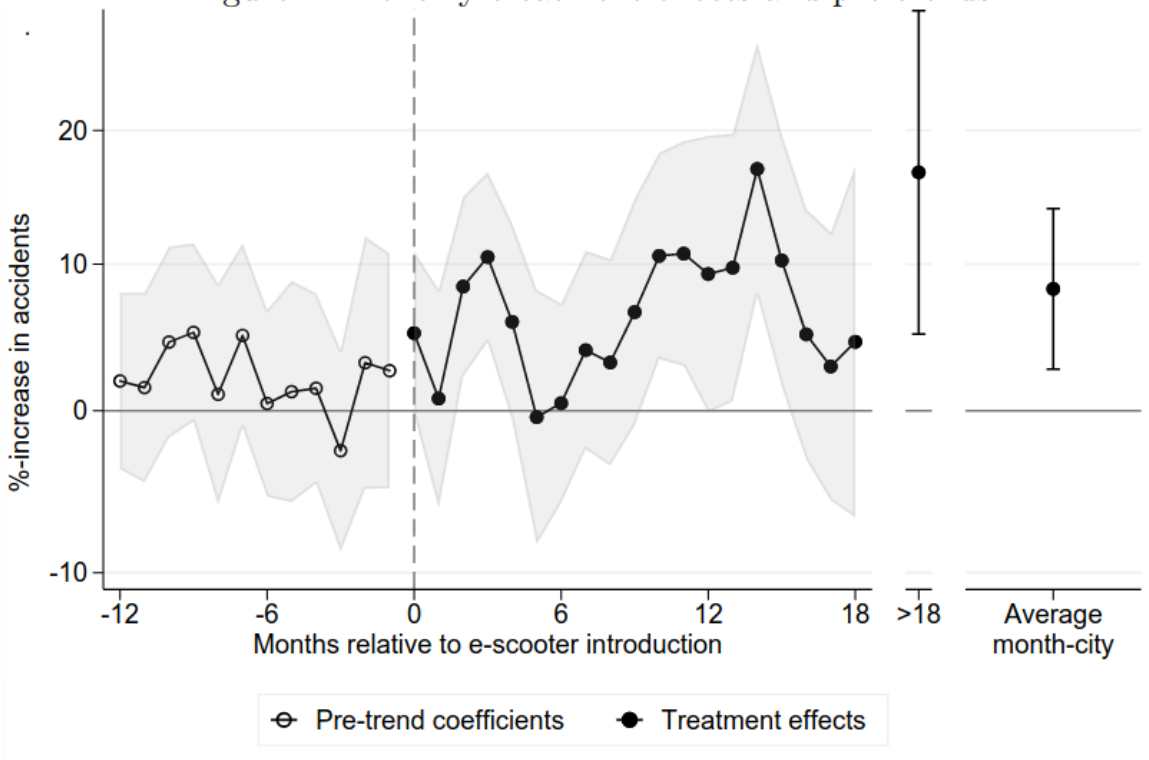


- Shows % change in accidents relative to treatment month.
- No indication of differential trends 3 years from introduction.

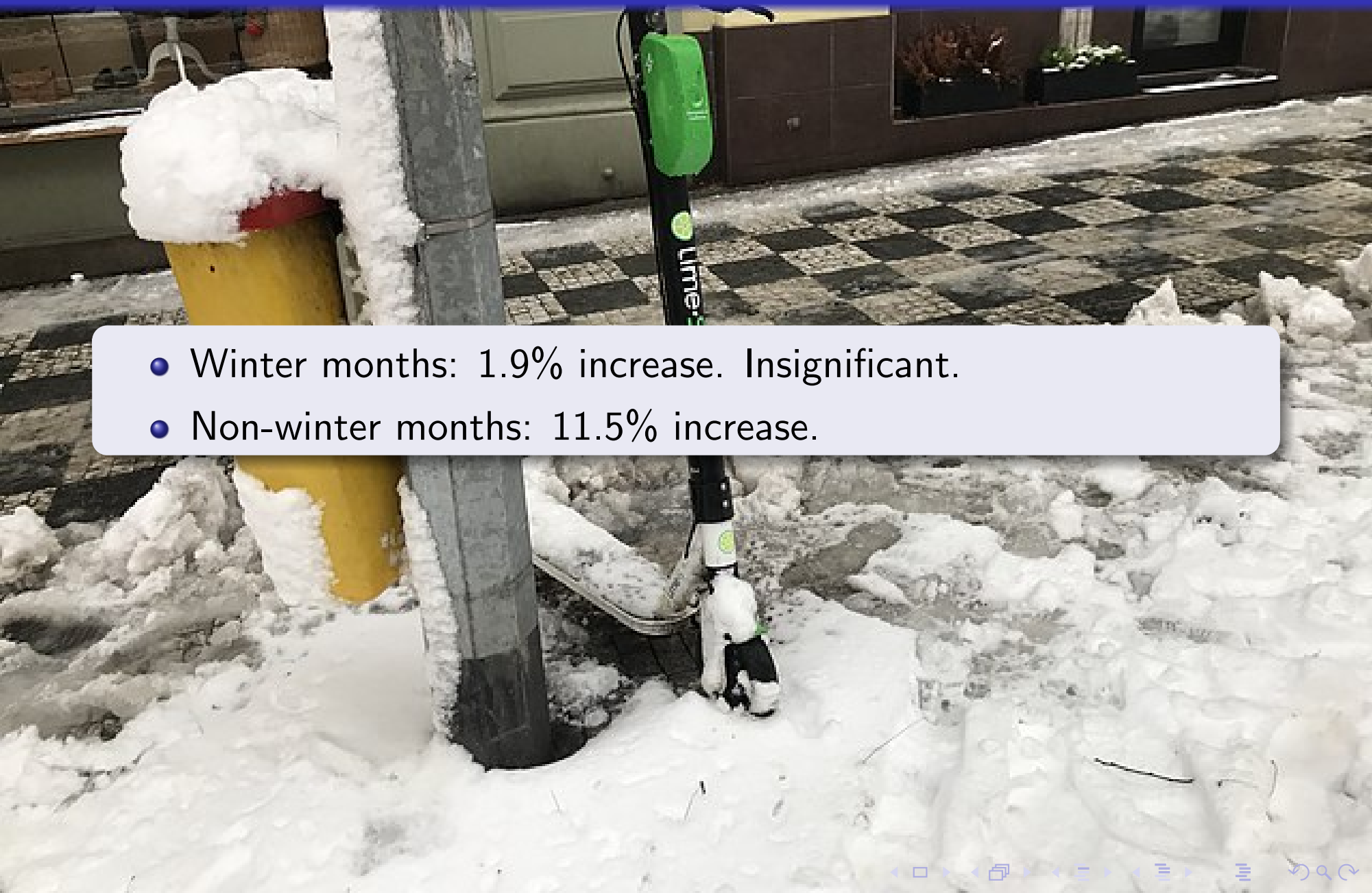
Main results

Introduction of shared e-scooter services cause an **8%** increase in monthly accidents with injuries.

Figure 1: Monthly treatment effects and pre-trends

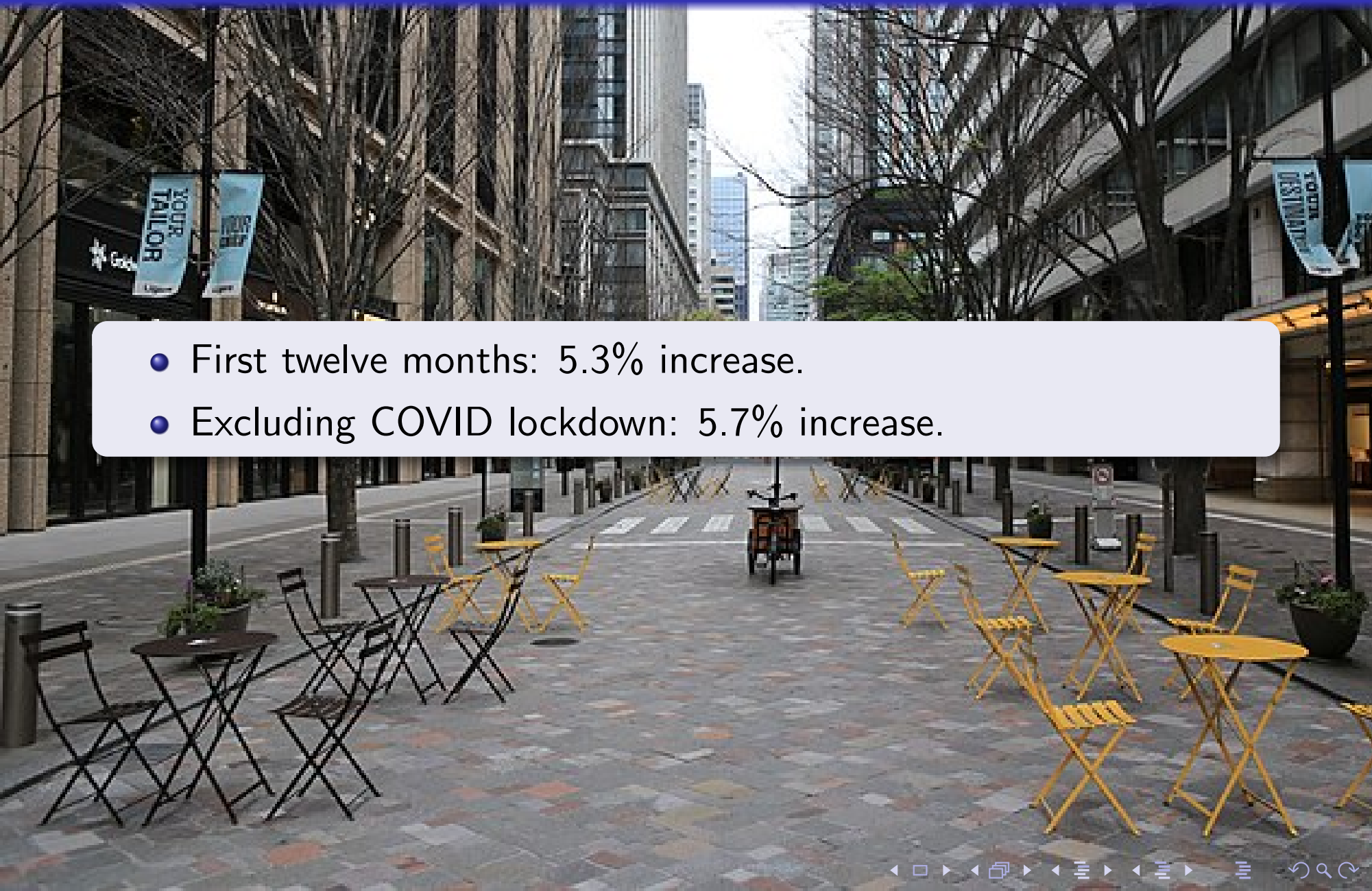


Falsification and alternative specifications



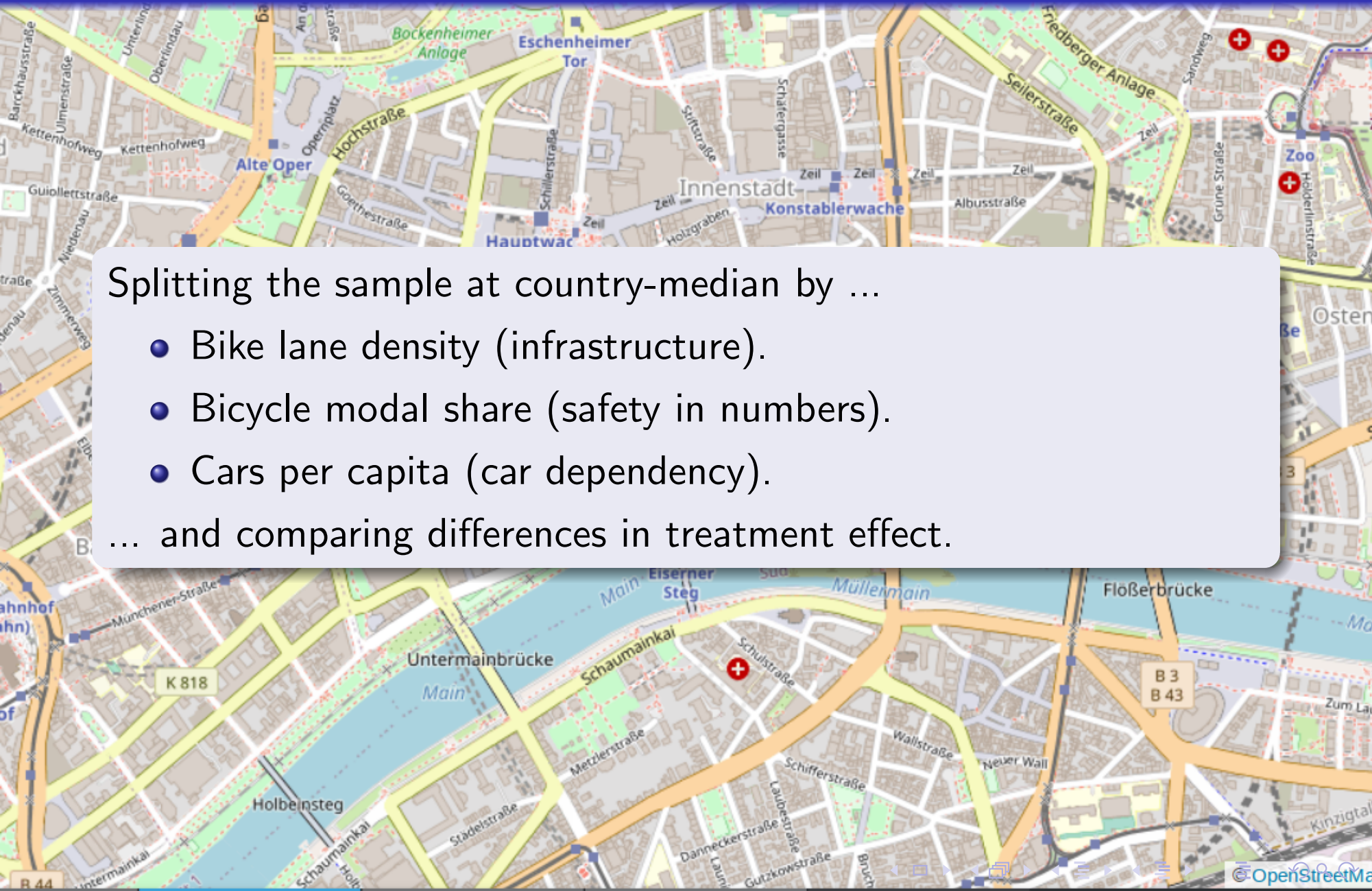
- Winter months: 1.9% increase. Insignificant.
- Non-winter months: 11.5% increase.

Falsification and alternative specifications



- First twelve months: 5.3% increase.
- Excluding COVID lockdown: 5.7% increase.

Heterogeneity analysis

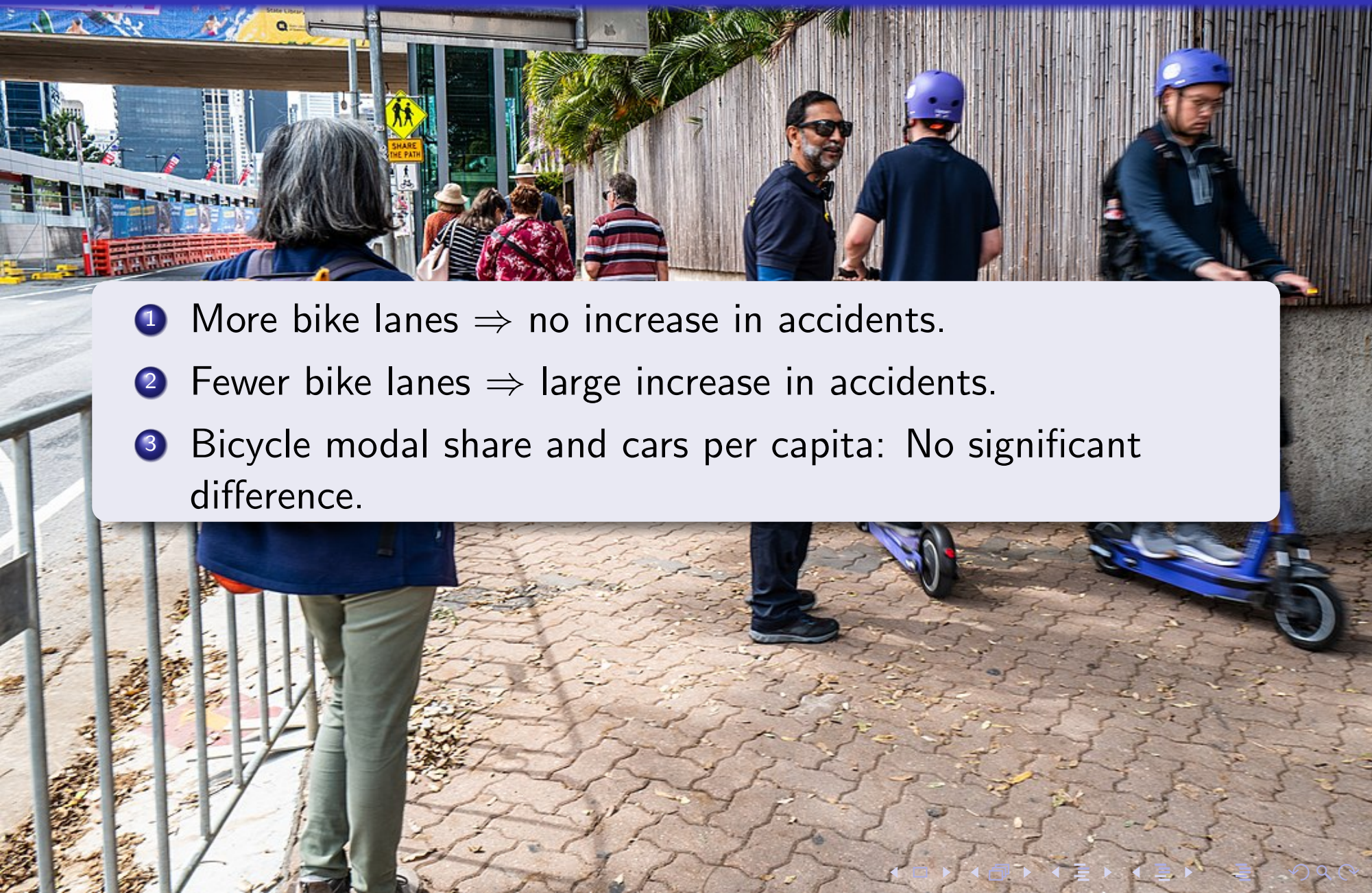


Splitting the sample at country-median by ...

- Bike lane density (infrastructure).
- Bicycle modal share (safety in numbers).
- Cars per capita (car dependency).

... and comparing differences in treatment effect.

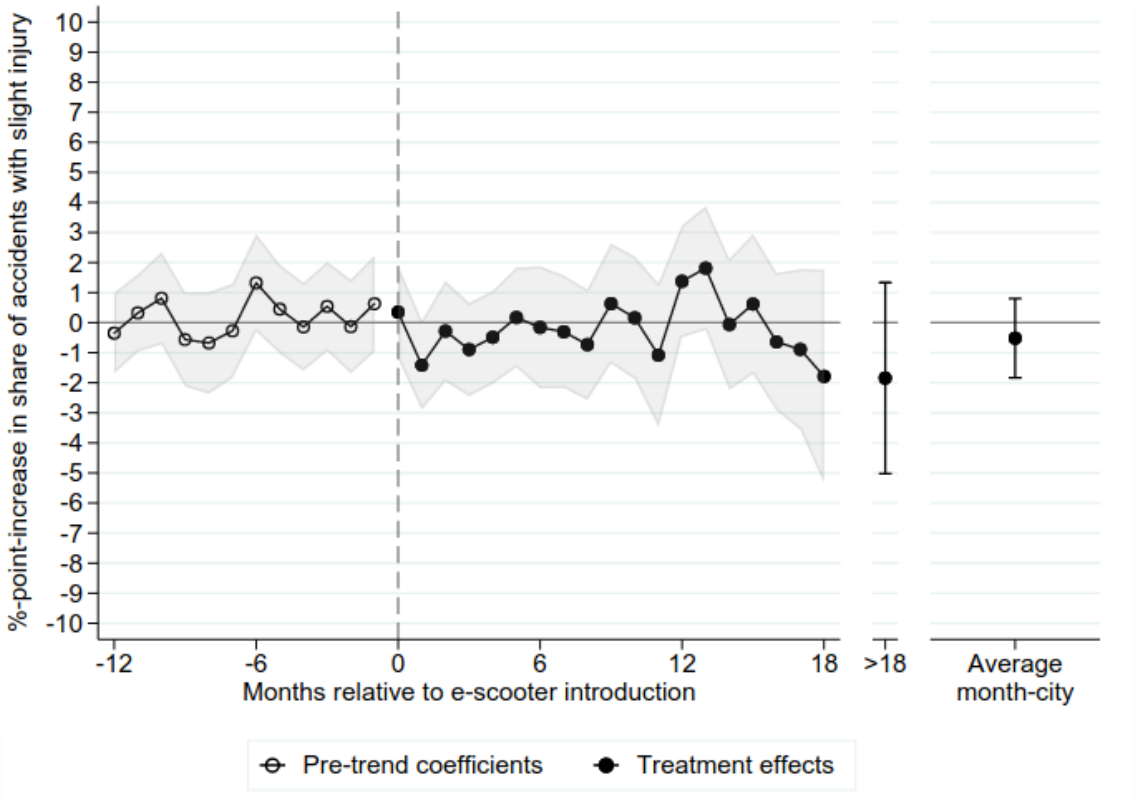
Heterogeneity analysis: Results



1. More bike lanes $\Rightarrow$ no increase in accidents.
2. Fewer bike lanes $\Rightarrow$ large increase in accidents.
3. Bicycle modal share and cars per capita: No significant difference.

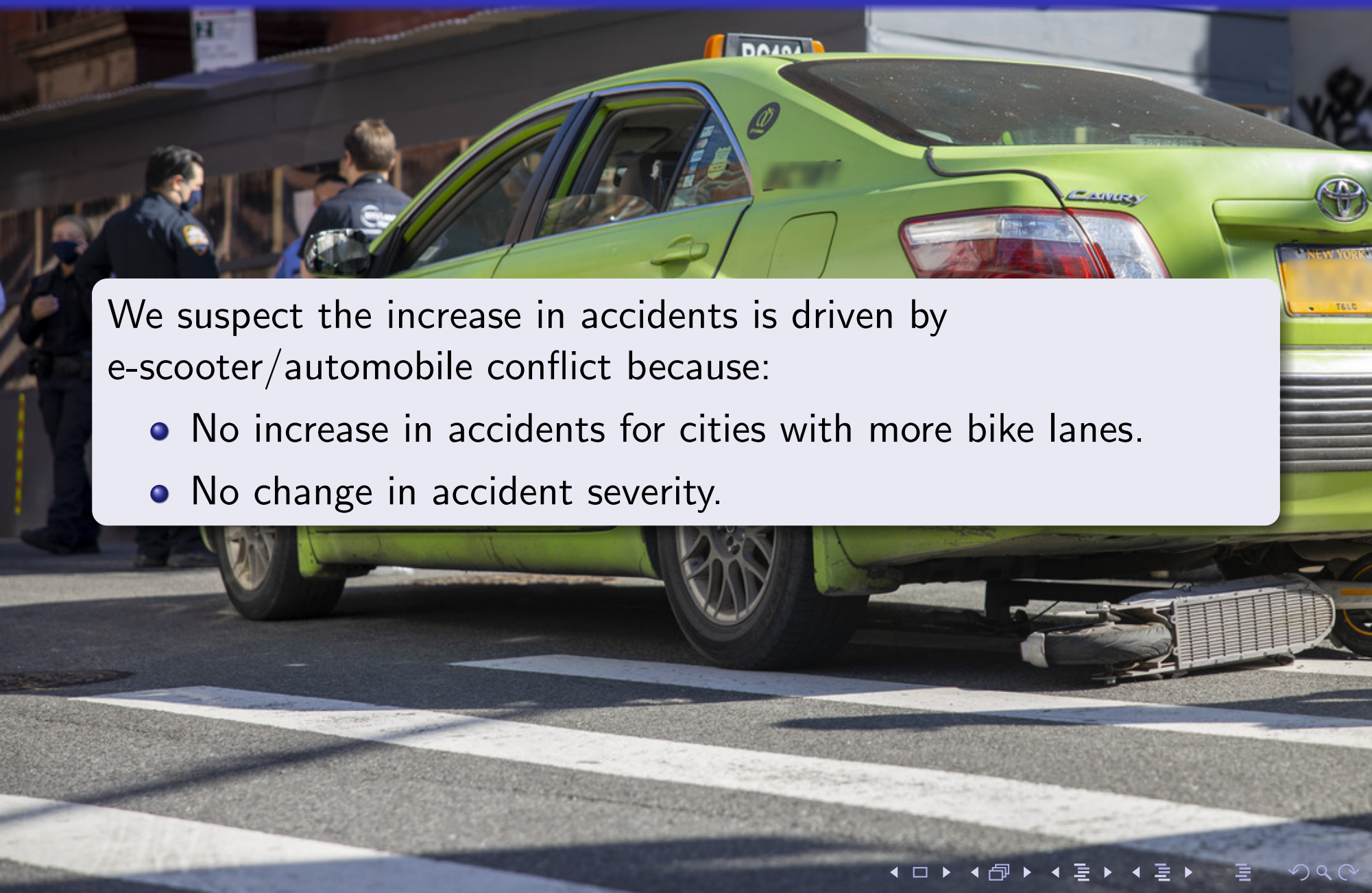
No change in severity of accidents

Figure: Percentage change in accident severity over time



- Reported e-scooter accidents likely just as severe and costly.

Conclusions



We suspect the increase in accidents is driven by e-scooter/automobile conflict because:

- No increase in accidents for cities with more bike lanes.
- No change in accident severity.

Conclusions continued

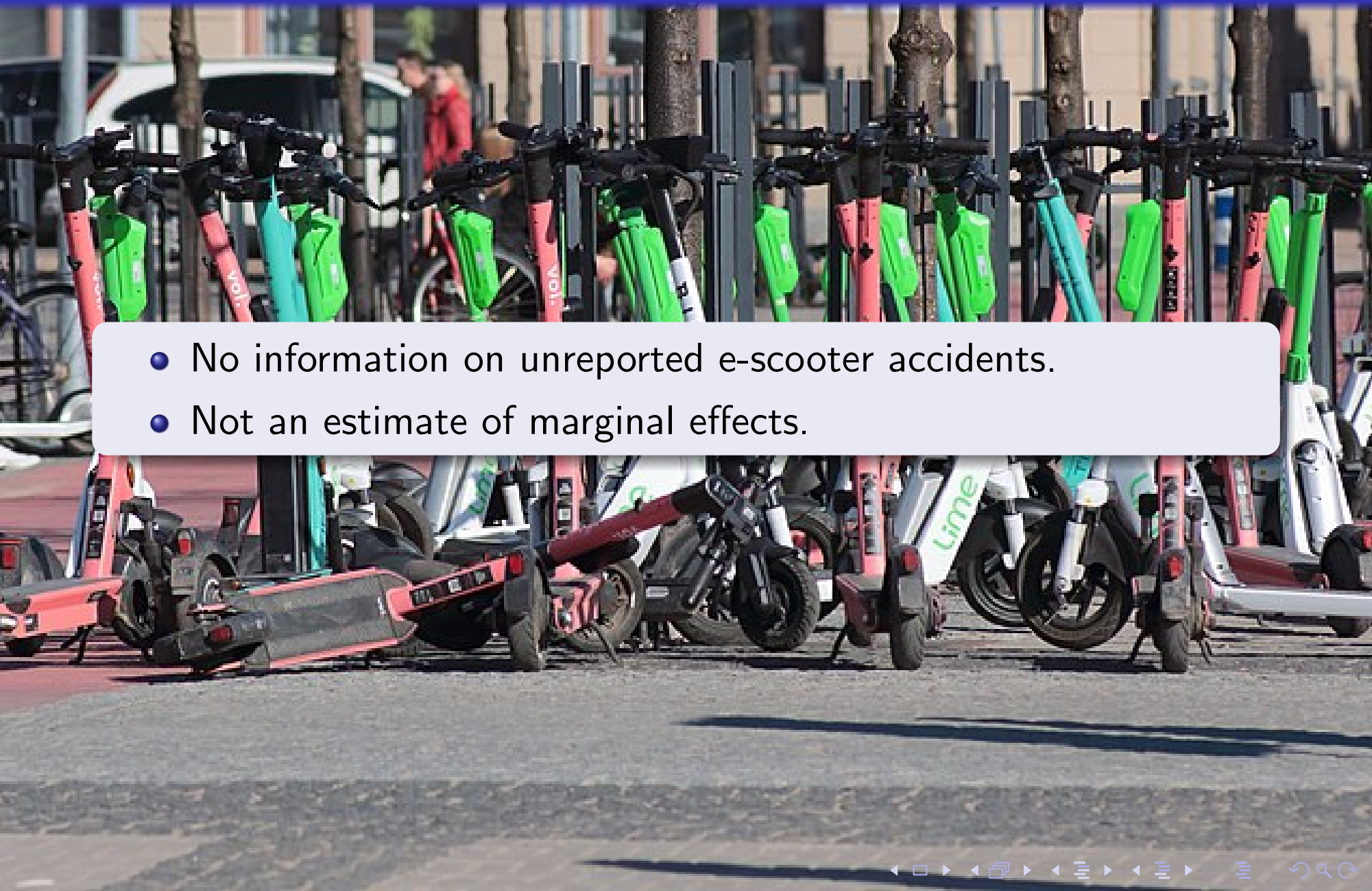
Some cities are better able to safely increase the modal share of micro-mobility users.

- Cities with higher bike lane density.
- Correlated policies or behaviors could drive effect.

Conclusions continued

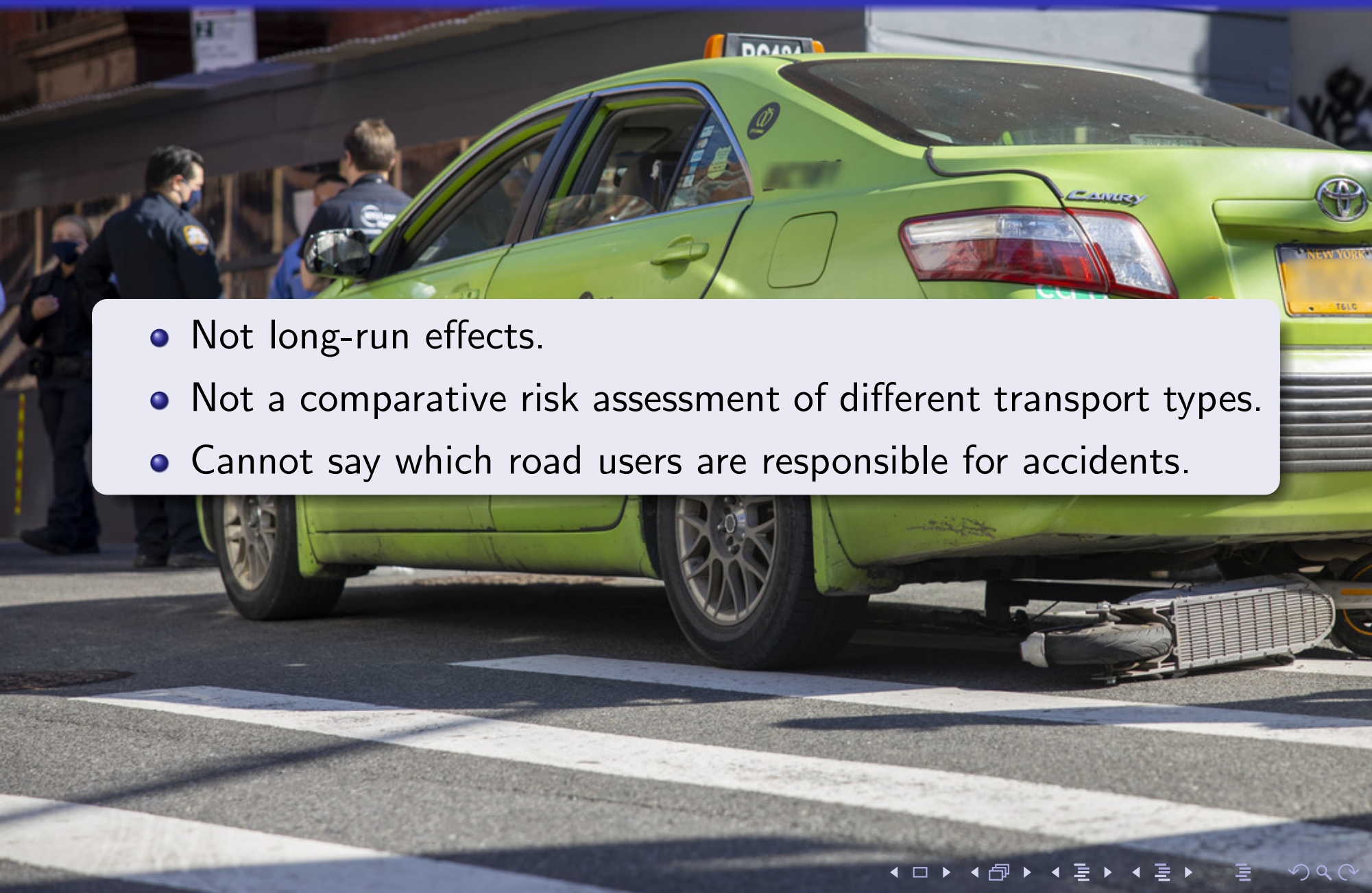
- Other cities less prepared to safely increase modal share.
- No evidence to support the Safety in Numbers theory.

Limitations



- No information on unreported e-scooter accidents.
- Not an estimate of marginal effects.

Limitations continued



- Not long-run effects.
- Not a comparative risk assessment of different transport types.
- Cannot say which road users are responsible for accidents.