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Does Crowdshipping of Parcels Generate New Passenger Trips? Evidence from the Netherlands

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Crowdshipping provides potentially flexible and cheaper parcel deliveries for users since it uses existing infrastructure and the crowd who are eager to deliver the parcel. The occasional carrier is assumed to make a short detour in total, which reduces the negative impacts of the last-mile. However, it is not fully clear if crowdshipping results in an increase of vehicle-km and full-time professions for some of its drivers.

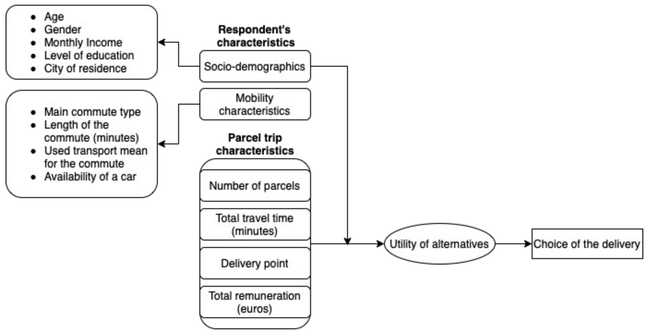
INTRODUCTION

- Crowdshipping is a service that links customers to a crowd of travelers (occasional carriers, OCs) who are willing to pick up and deliver packages to the other ends.
- Through an online platform, sender and OC can be easily matched, which is the most promising novelty of this business model. The service is expected to be environmentally friendly since it uses the existing infrastructure and trips.
- OCs are characterized as "those who travel anyway". However, we argue that crowdshipping might also cause externalities if the OCs start a new trip.

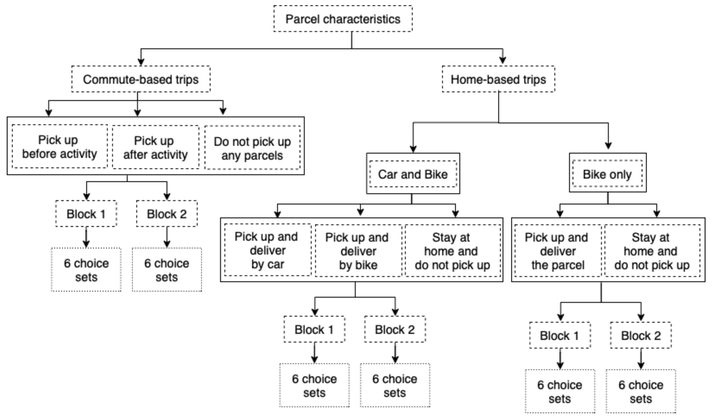
OBJECTIVES

- To investigate the generation of new trips in the case of becoming an OC as well as the use of parcel lockers in crowdshipping
- To explore the heterogeneity in preferences amongst those who might become an OC

CONCEPTUAL MODEL



Stated Preference Experiment



CHOICE SITUATIONS (COMMUTE AND HOME-BASED)

	Normal trip	Pick up BEFORE activity	Pick up AFTER activity
Number of Parcels		1	2
Total Travel Time (minutes)	10	15	30
Delivery Point			
Total Remuneration (euros)		5	20

Which of the alternatives above you would choose?
- Do not pick up any parcels
- Pick up and deliver the parcels before the activity
- Pick up and deliver the parcels after the activity

Commute-based trips (Part1)

a

	Deliver parcels by Car	Deliver parcels by Bike
Number of Parcels	1	1
Mode		
Total Travel Time (minutes)	15	30
Delivery Point		
Total Cost (euros)	1	0
Total Remuneration (euros)	3	3

Would you:
- Stay home and do not pick up any parcels
- Pick up and deliver the parcels by bike
- Pick up and deliver the parcels by car

Home-based trips
(Part2, car and bike available)

b

	Deliver parcels
Number of Parcels	3
Total Travel Time (by bike, in minutes)	40
Delivery Point	
Total Remuneration (euros)	45

Would you:
- Stay home and do not pick up any parcels
- Pick up and deliver the parcels

Home-based trips
(Part2, Only bike available)

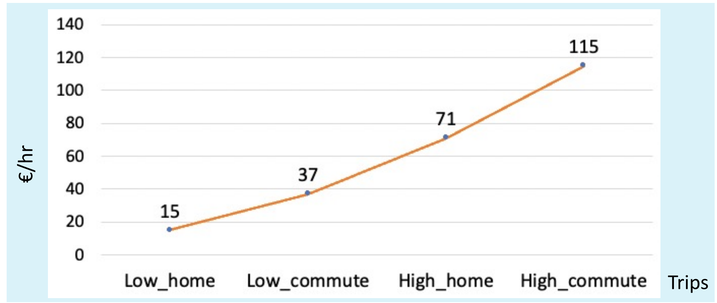
MODEL RESULTS

TABLE 1 – Model Estimates

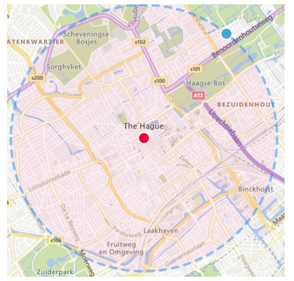
	Low-income Level		High-income Level	
Main attributes	Est.	t-value	Est.	t-value
Total Travel Time (Commute-based)	-0.053	-4.08*	-0.18	-3.67*
Total Travel Time (Home-based)	-0.020	-2.01*	-0.11	-3.67*
Parcel locker (Commute-based)	0.358	1.68**	0.358	1.68**
Remuneration	0.085	8.38*	0.095	4.628*
ASC-Before Activity	0.662	3.314*	-0.341	-0.473
ASC-After Activity	1.048	5.462*	0.040	-0.048
ASC-Bike from Home	-0.722	-2.942*	-0.893	-1.546**
ASC-Car from Home	-1.127	-2.81*	-3.364	-4.181*
Class membership (Socio-demographics)				
Income (>2000€)	-1.745	-4.073*		
Class membership constant	1.842	2.621*		
Model fit				
LL (start)		-2206.88		
Final LL (whole model)		-1666.01		
Adj. McFadden's rho-squared (ρ^2)		0.24		
AIC		3366.02		
BIC		3464.33		
Number of individuals		250		
Number of choice sets		2400		
Class share	71%		29%	

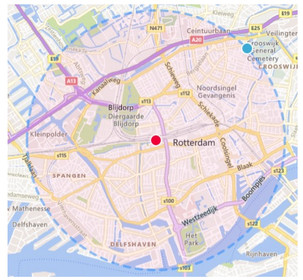
*Significance level on 95% confidence interval
**Significance level on 90% confidence interval
"ASC" stands for Alternative Specific Constant

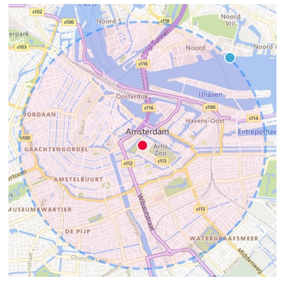
- Estimated coefficients have the expected signs.
- The LCCM shows two classes: Low-income and high-income groups.
- Around 70% of the sample are from the lower income group, while 30% from the higher income one.
- Parcel lockers have a positive impact on the willingness to be an OC in the commuter case, with the same coefficient for both classes.
- The largest difference among classes is shown in the Value of Time (VoT) below.



- High and low-income drivers are willing to deviate 5 and 16 minutes respectively for a remuneration of 10€.
- In Local-to-local (L2L) context, 5€ remuneration for home-based trips covers dense urban areas.







CONCLUSIONS

- Crowdshipping might lead to generation of new trips.
- Impact of the new trips depends on the mode chosen.
- Low-income respondents will be attracted the most and they are more likely to initiate independent trips since their value of time is lower than high-income group.
- Home-based crowdshipping might be feasible for L2L deliveries since 5€ remuneration covers a big portion of the populated areas in the Netherlands.
- New research could include the impact of the trip conditions such as weather and relative impact of alternative mode of transport.