XXV Convegno SIDT

20 DICEMBRE 2021

Mobilità e trasporti
un nuovo presente per una ripresa sostenibile

The psychological impacts of COVID 19 on travel behaviour and mode preferences: the case study of the University of Salerno

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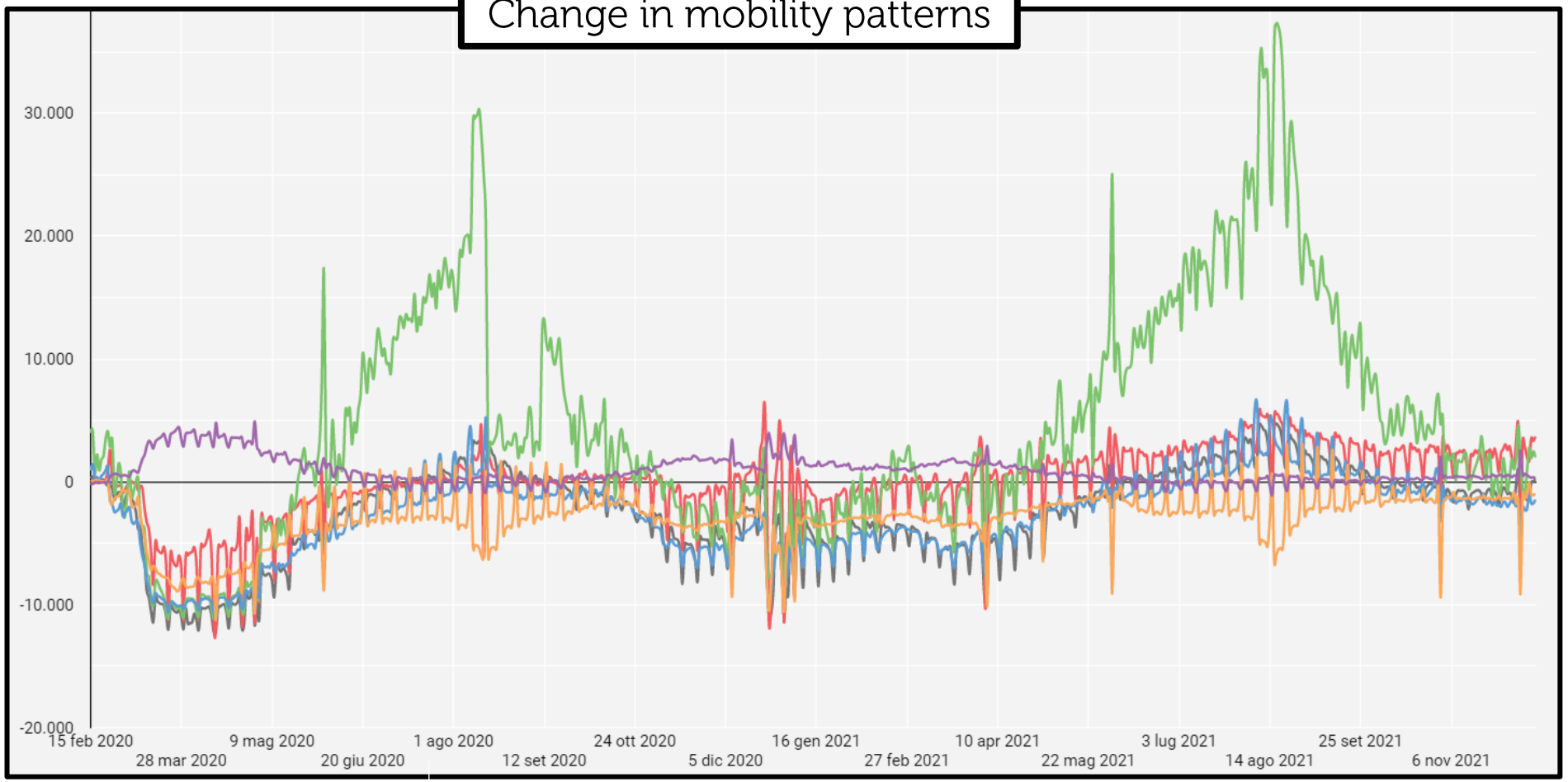
University of Salerno
Department of Civil Engineering

OUTLINE

- Introduction and Motivation
- Methodological framework
- Experimental framework
- Descriptive and statistical analyses
- Modelling results
- Main conclusions

Change in mobility patterns



Retail and recreation
Grocery and pharmacy
Parks
Transit stations
Workplaces
Residential

COVID 19- Italian Google Mobility Report

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Change in modal choices

	Average 2019	12 March - 10 April (first 30 days of Lockdown)	12 March - 3 May (entire Lockdown)
Active mobility (walking, cycling, other non-motorised transport)	25.1	38.0	34.9
Private mobility (cars, motorbikes, other private motorised vehicles)	62.6	57.0	61.0
Public and interchangeable mobility (public transport, transport)	12.2	5.0	4.1

Modal split, before and during Lockdown. Adapted from Isfort, "Audimob" observatory - Data on Italians' mobility behaviour 2019 and 2020

Travel behavior and phycological traits

Investigated topics	key determinants
Risk perception	Personal Vulnerability
	Comparative Vulnerability
	Risk Severity
	Evolution of perceived risk severity
Prevention measures	Actions
	Places of risk
	Virus awareness
Social dimension	Social Norms
	Social Inequality

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Preferences (SE, LOS)

Attitudes and Perceptions

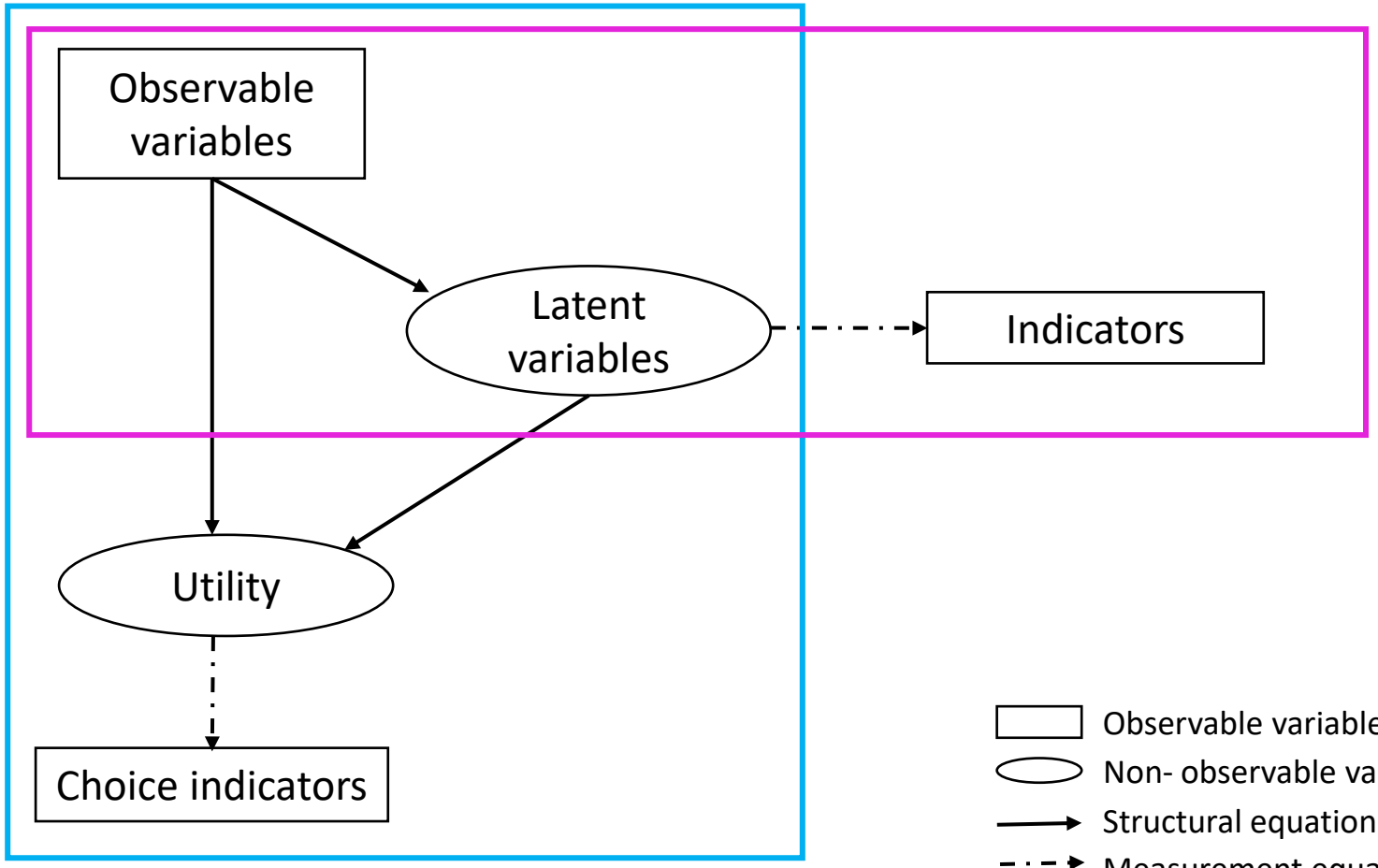
Emotional state

Motivations

Information

Decision-making process

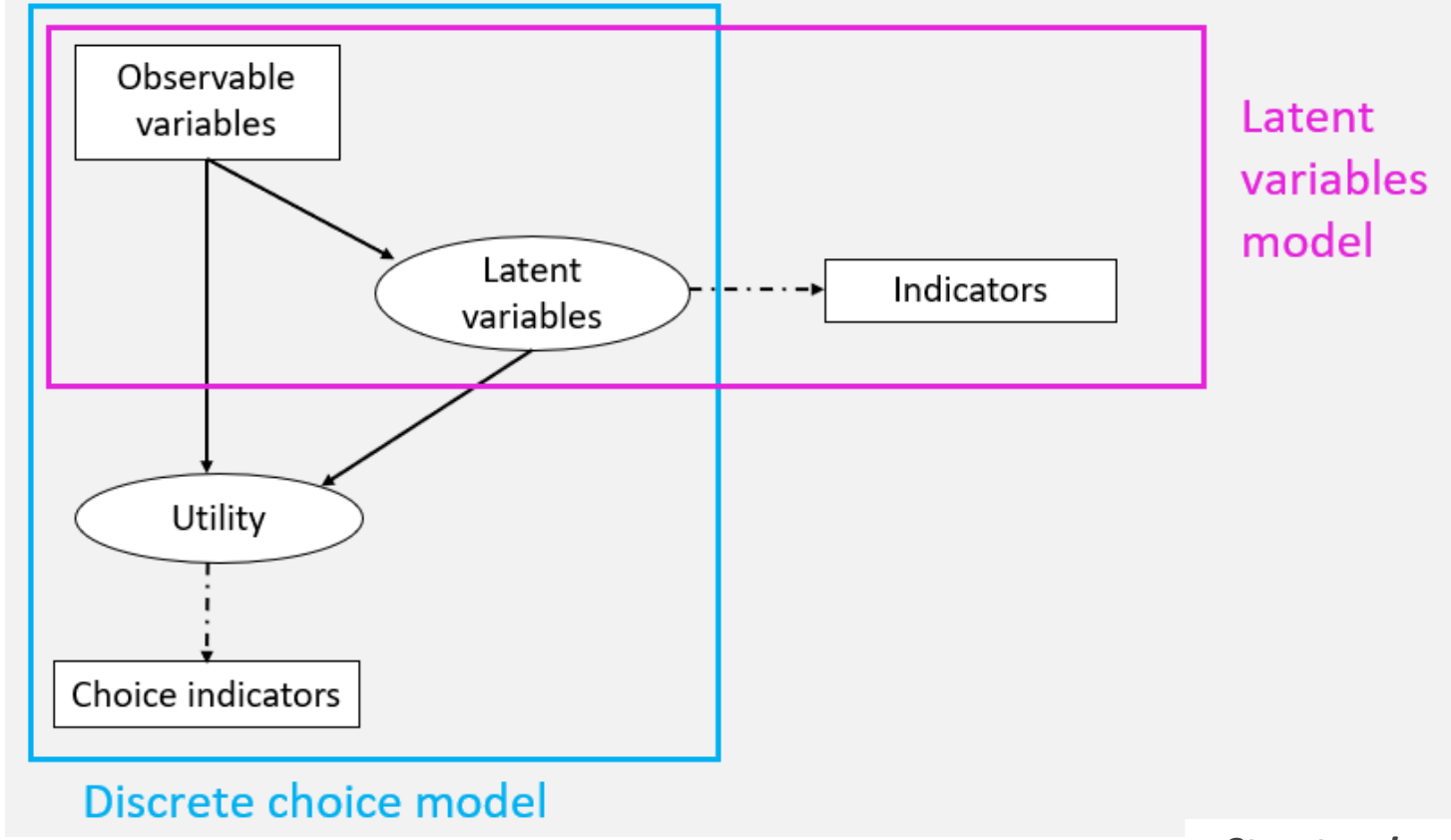
CHOICE



Latent variables model

Discrete choice model

Observable variables
Non- observable variables
Structural equations
Measurement equations



Discrete choice model

$$p_j^i = \Pr\left[U_j^i > U_k^i\right]$$

$$U_j = \left(\sum_s \beta_s \cdot x_s + ASC_j\right) + \varepsilon_j$$

$$U_j = \left[\left(\sum_s \beta_s \cdot x_s + ASC_j\right) + \sum_{L_j} \beta_{Zj} \cdot Z_j\right] + \varepsilon_j$$

Structural equations

$$Z_i = \left(\bar{Z}_i + \sum_{m=1}^{M} \lambda_m x_m\right) + \omega_i$$

Measurement equations

$$I_r = (\alpha + \rho_Z \cdot Z_i) + \epsilon_r$$

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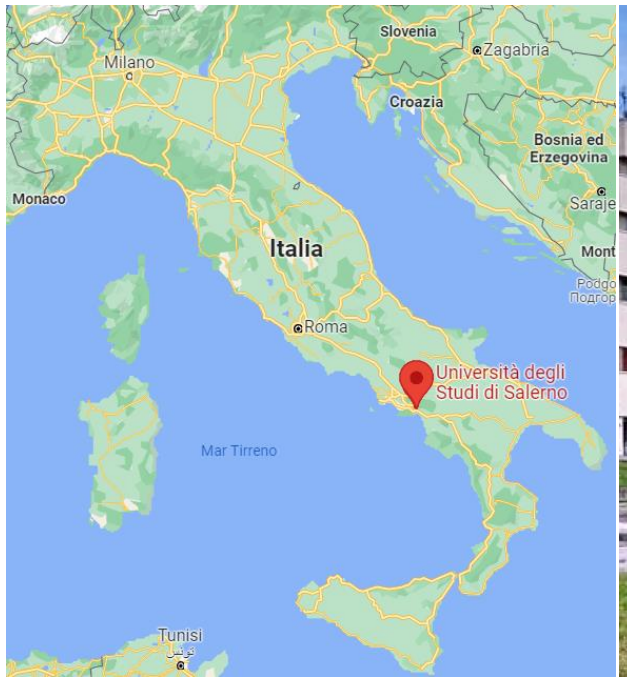

Over 100 courses (Bachelor, Master, PHD, Master)

Around 40,000 students

Authorised entry employees: 650

Sample rate: 30%

Sample size: around 200 respondents

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Survey description

4 SECTIONS:

- SOCIOECONOMIC CHARACTERISTICS
- INDIRECT QUESTIONS RELATED TO COMMUTING ORIGIN
- TRAVEL HABIT
- PSYCHO-ATTITUDINAL TRAITS

Survey description

PSYCHO-ATTITUDINAL ITEMS	
How much do you agree with the expression….? (5-point Likert scale)	
1	I am very concerned about the possibility of being infected by other people
2	I am concerned that I might be the cause of the contagion
3	I do not fear the effects that COVID may have on my body.
4	I fear the effects of the virus on my family members' health (children, grandparents, partner)
5	When I go out I pay close attention to social distancing
6	When I'm not working I try to stay home and only move around for primary/urgent needs
7	I am concerned about the effects that COVID will have on the future of the world and Italian economies.

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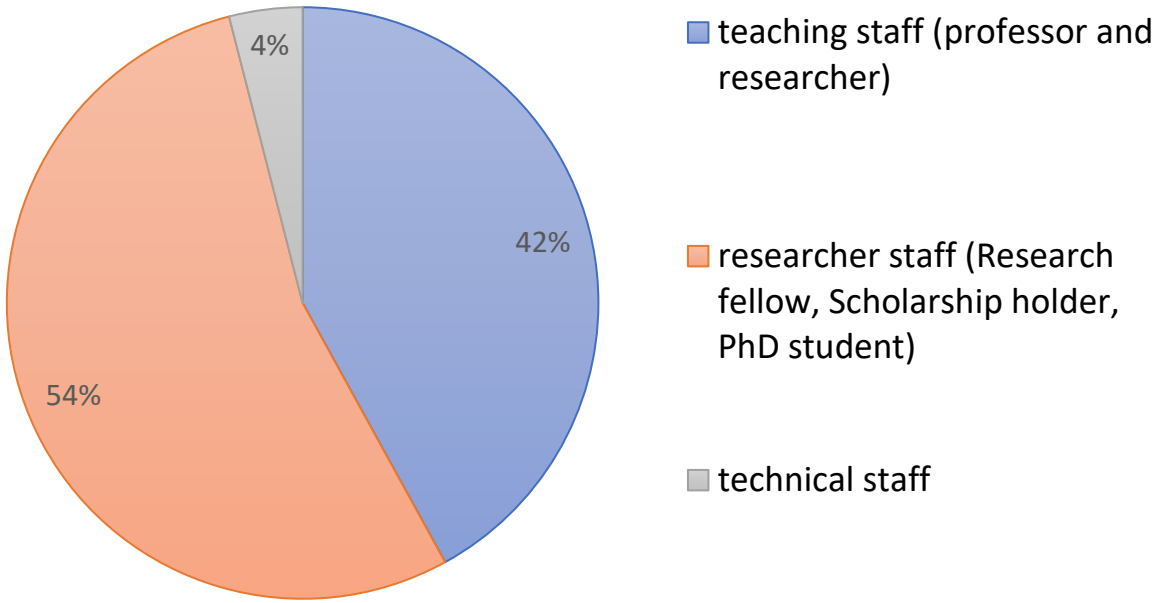
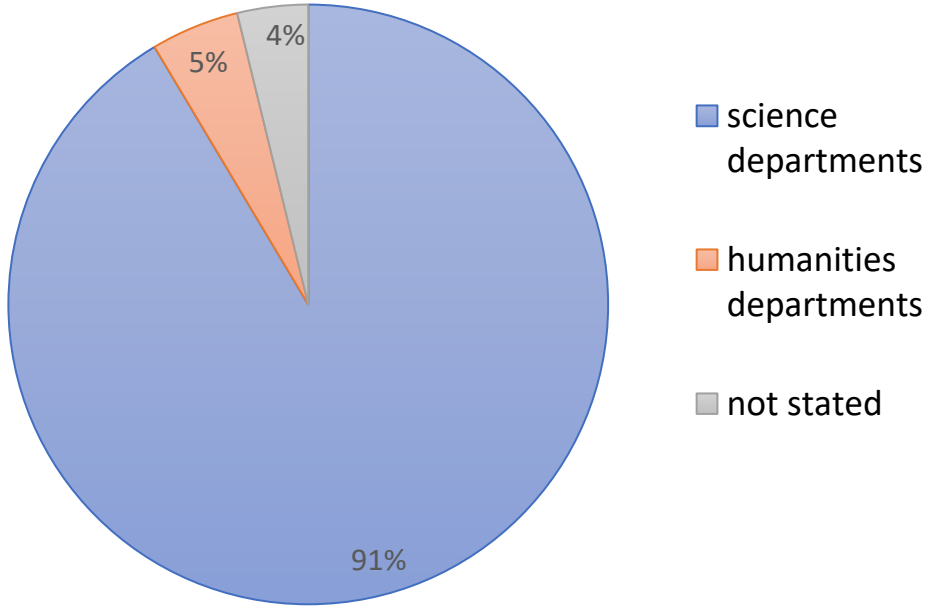
DESCRIPTIVE ANALYSES

Employment status

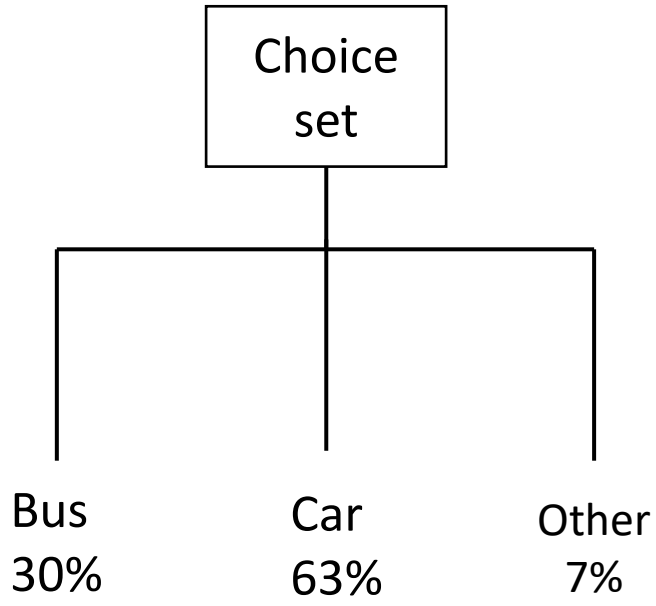


Department of affiliation



DESCRIPTIVE ANALYSES

Pre-Covid phase

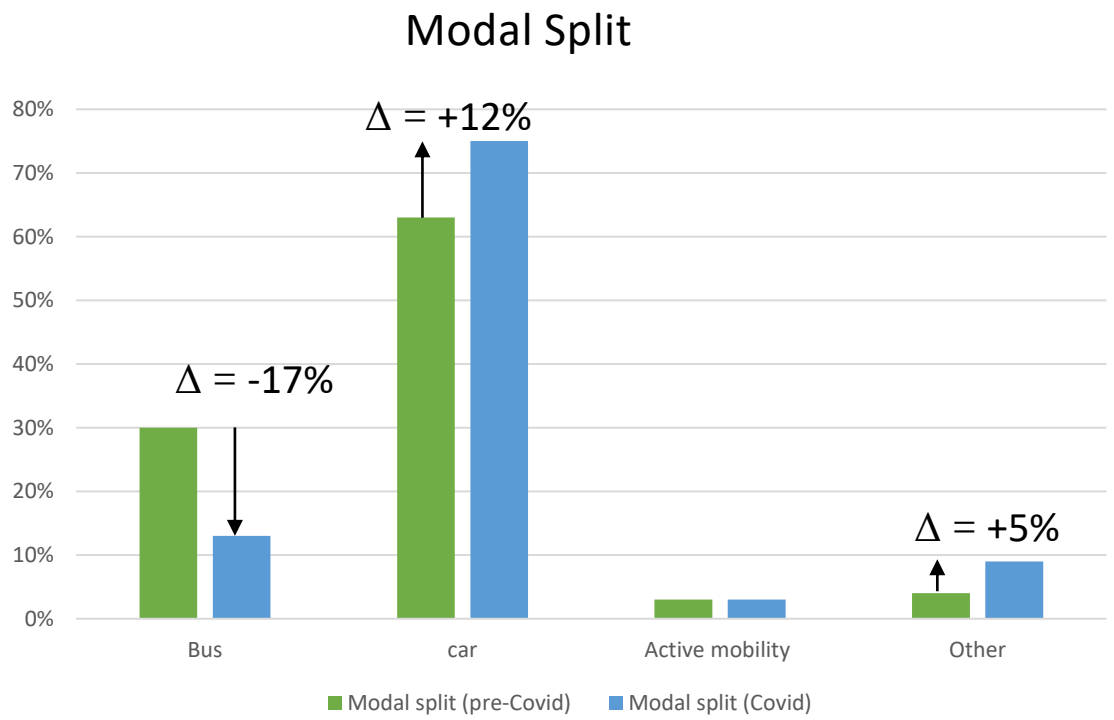


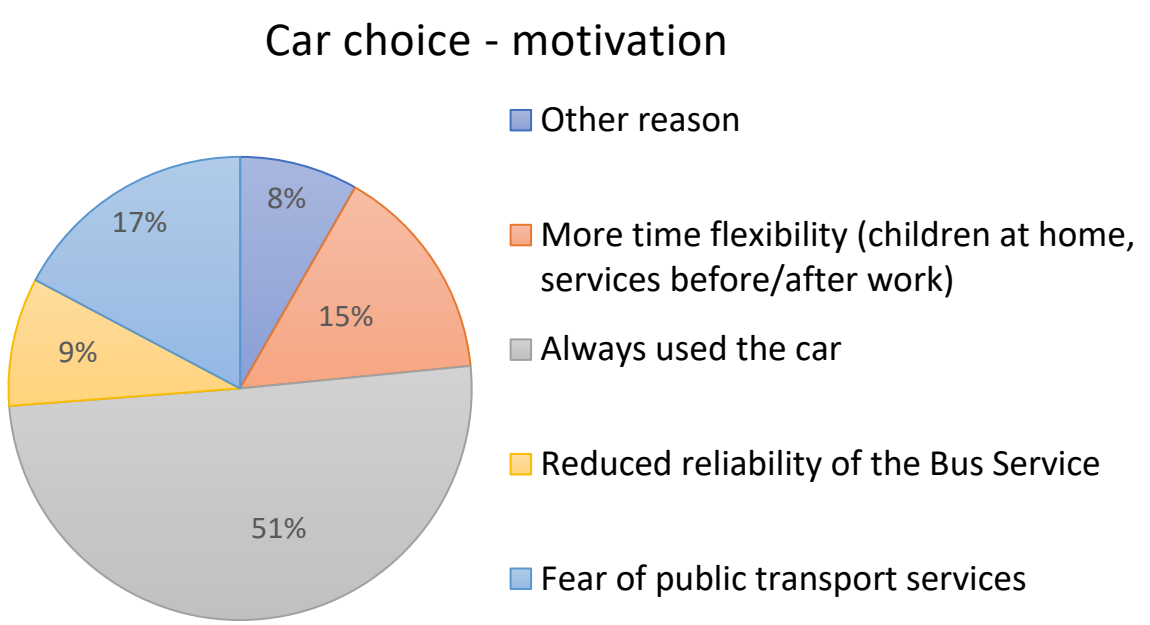
Bus & Car availability	74%		
	Bus	Car	Other
Modal split	21%	71%	8%

Every-day commute	87%		
	Bus	Car	Other
Modal split	25%	67%	8%

DESCRIPTIVE ANALYSES

Covid phase *





* assuming public transportation completely restored

DESCRIPTIVE ANALYSES

Covid phase – psychological factors

	Items
1	Fear of being infected
2	Fear of being cause of the contagion
3	Fear of covid effects
4	Fear of covid effects on family health
5	Attention to social distancing
6	Stay home
7	Anxiety about economic effects

	 In agreement	 Neutral	 In disagreement
1	50%	**33%**	17%
2	45%	**34%**	21%
3	**77%**	14%	9%
4	**89%**	8%	3%
5	38%	1%	**62%**
6	**82%**	13%	5%
7	**71%**	23%	6%

STATISTICAL ANALYSES

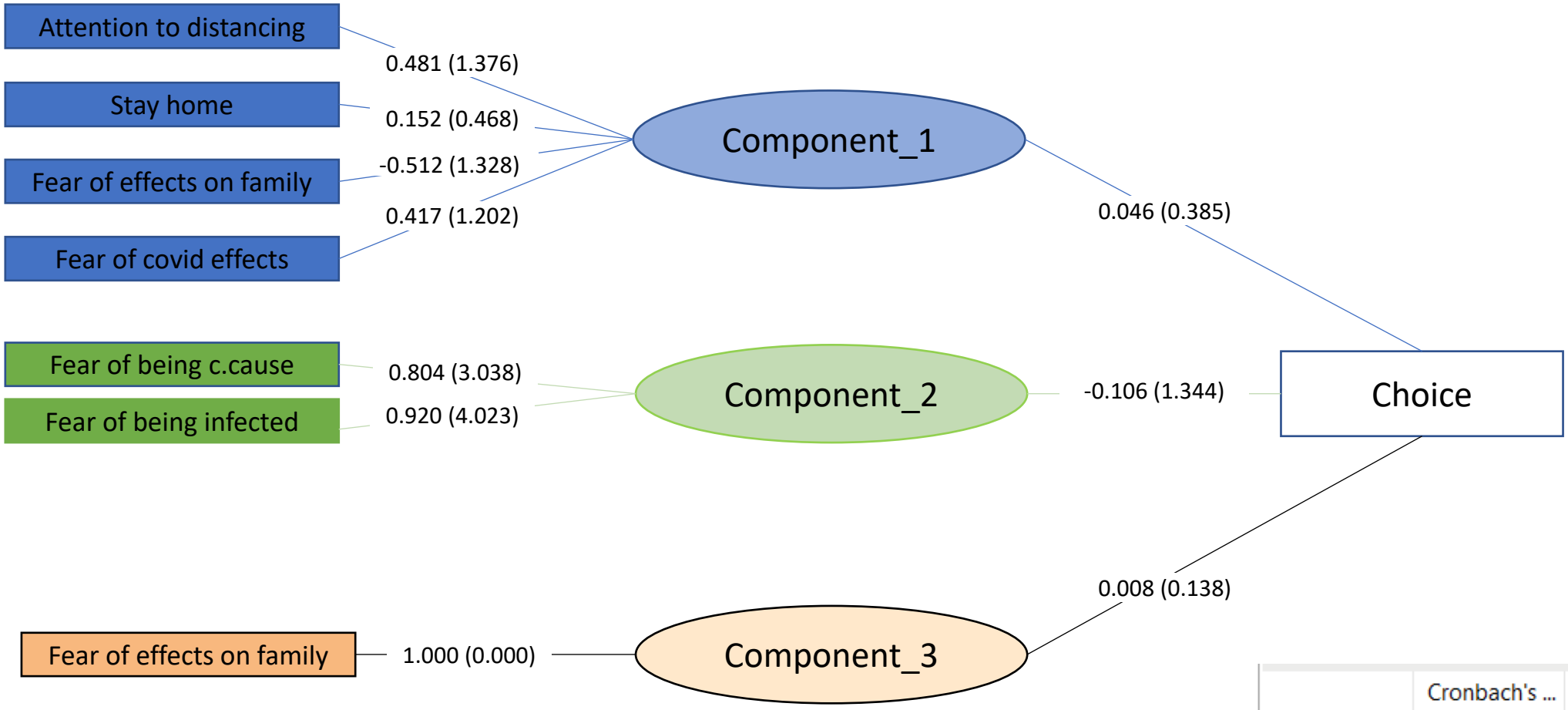
Covid phase – psychological factors

Items		Components*		
1	Fear of being infected	0,334	**0,788**	0,070
2	Fear of being cause of the contagion	0,032	**0,877**	0,058
3	Fear of covid effects	**0,535**	0,353	-0,402
4	Fear of covid effects on family health	**0,632**	0,215	0,250
5	Attention to social distancing	**0,851**	-0,027	0,082
6	Stay home	**0,676**	0,213	- 0,032
7	Anxiety about economic effects	0,137	0,125	**0,904**

		Cronbach's alpha
1	Fear of being infected	**0,635**
	Fear of being cause of the contagion	
2	Fear of covid effects	**0,673**
	Fear of covid effects on family health	
	Attention to social distancing	
	Stay home	
	Anxiety about economic effects	

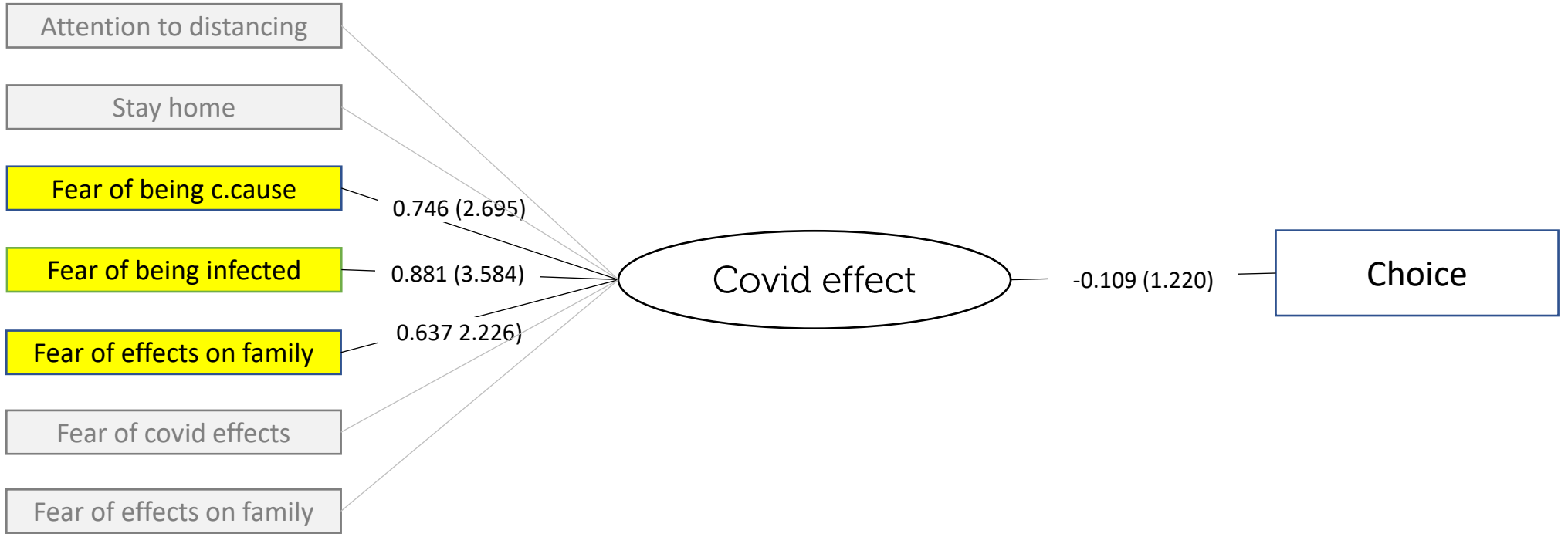
* Extraction method: Principal component analysis.
Rotation method: Varimax with Kaiser normalization

STATISTICAL ANALYSES



	Cronbach's ...	Composite ...	Average Va...
PCA1	0.668	0.080	0.173
PCA2	0.673	0.854	0.747

STATISTICAL ANALYSES



	Cronbach's Alpha	Composite Reliability	Average Variance Extracted (AVE)
effetto covid	0.633	0.802	0.579
scelta	1.000	1.000	1.000

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Choice set

1) car and motorcycle
(car, motorcycle, carpooling,transit)

2) Public transport
(bus, train, bus&train)

3) Active mobility
(walking, biking)

Choice set

1) car and motorcycle
(car, motorcycle, carpooling,transit)

2) Public transport
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3) Active mobility
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Model Specification

1)Multinomial Logit

2) Hybrid Multinomial Logit

β	MNL_ pre-covid			MNL_covid		
	Car	Public transport	Active mobility	Car	Public transport	Active mobility
Age	-0.03			-0.09		
Family_ commitment _indicator	+3.27			+6.18		
Income_indicator	+3.67			+7.01		
TS_researcher	+1.72					
Pre_covid_3_4_days	-1.08					
RS_research_associate				+4.10		
RS_research_fellow				-3.53		
Currently_alternate						+5.30
Prefer_working_remotely				+3.66		
Return_home_13_14						+3.64
Travel_time	-0.02	-0.02	-0.02	-0.10	-0.10	-0.10
Travel cost	-0.18	-0.18		-0.54	-0.54	
ASC	-2.23			-4.61	+1.99	
STATISTICS						
Rho-square	0.347			0.690		
Adjusted rho-square	0.279			0.484		

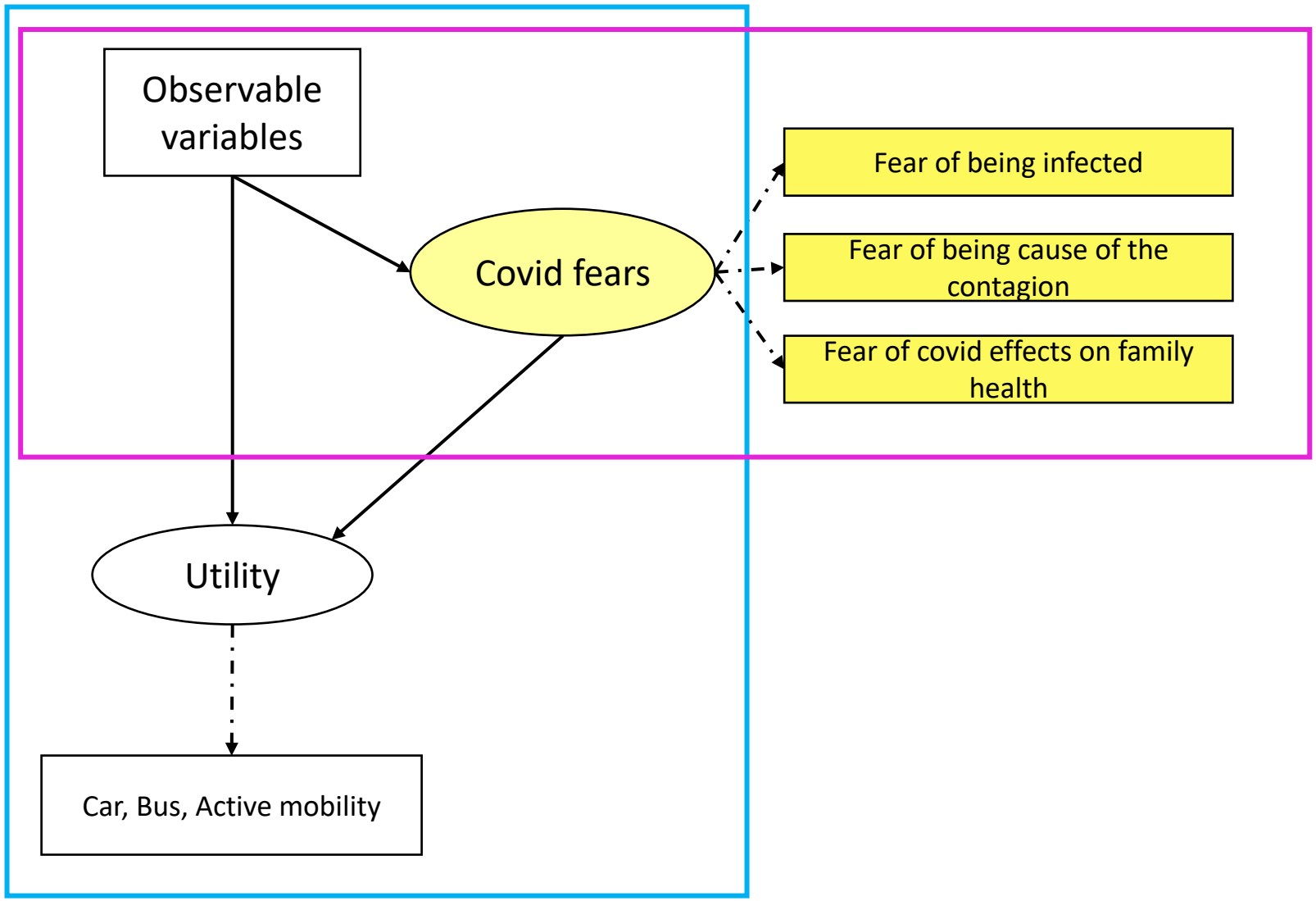
β	MNL_ pre-covid			MNL_covid		
	Car	Public transport	Active mobility	Car	Public transport	Active mobility
Age						
Family_ commitment _indicator						
Income_indicator						
TS_researcher						
Pre_covid_3_4_days						
RS_research_associate						
RS_research_fellow						
Currently_alternate						
Prefer_working_remotely						
Return_home_13_14						
Travel_time	-0.02	-0.02	-0.02	-0.10	-0.10	-0.10
Travel cost	-0.18	-0.18		-0.54	-0.54	
ASC						
STATISTICS						
Rho-square	0.347			0.690		
Adjusted rho-square	0.279			0.484		

$$VOT\ \left[\frac{€}{h}\right] = \frac{\beta_t}{\beta_c}$$

6,6

11,1

Hybrid Multinomial Logit



β	HCM		
	Car	Public transport	Active mobility
Family_ commitment indicator	+3,8		
RS_research_associate	+2,66		
RS_research_fellow_or_PhD	-1,42		
Currently_alternate			+6.36
Prefer_working_remotely	+3.55		
Return_home_13_14			+4.78
Travel_time	-0.11	-0.11	-0.11
Travel cost	-0.46	-0.46	
ASC			-1.97
Z1		**-0,343**	
STATISTICS			
Rho-square	0.458		
Adjusted rho-square	0.443		

Latent variable Z1: Covid fears	
1_1	Fear of being infected
1_2	Fear of being cause of the contagion
1_3	Fear of covid effects on family health

Structural equation

$$Z_1 = \mathbf{0,104} * \text{members in the household} + \mathbf{1.8}$$

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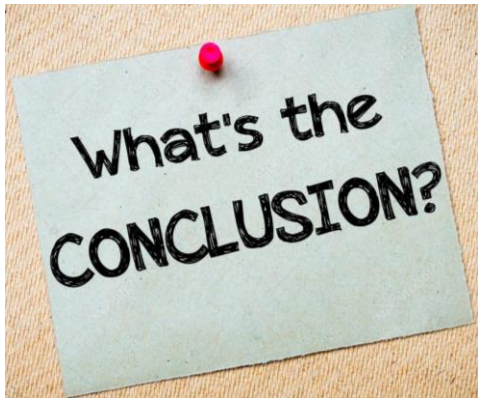

- A decrease in bus commuting in favor of the car alternative has been observed; Among those who chose the car alternative, 17% declared that this choice was associated with a perception of reduced safety on public transport.

- Comparing the value of time for the pre-covid and covid phases there is an increase in value of time (from 6,66 to 11,11); This suggests the need to act on public transport, trying to reduce the time spent on them.

- Perceived fears leads users to avoid public transport. Therefore, in order to ensure a return to a more sustainable mobility, that in case consists in public transport, the university worked to reassure users, trying to guarantee the greatest possible safety level

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