

# Preferred citation style

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# In-store or online grocery shopping before and during the COVID-19 pandemic

A. Meister, C. Winkler, B. Schmid, & K.W. Axhausen

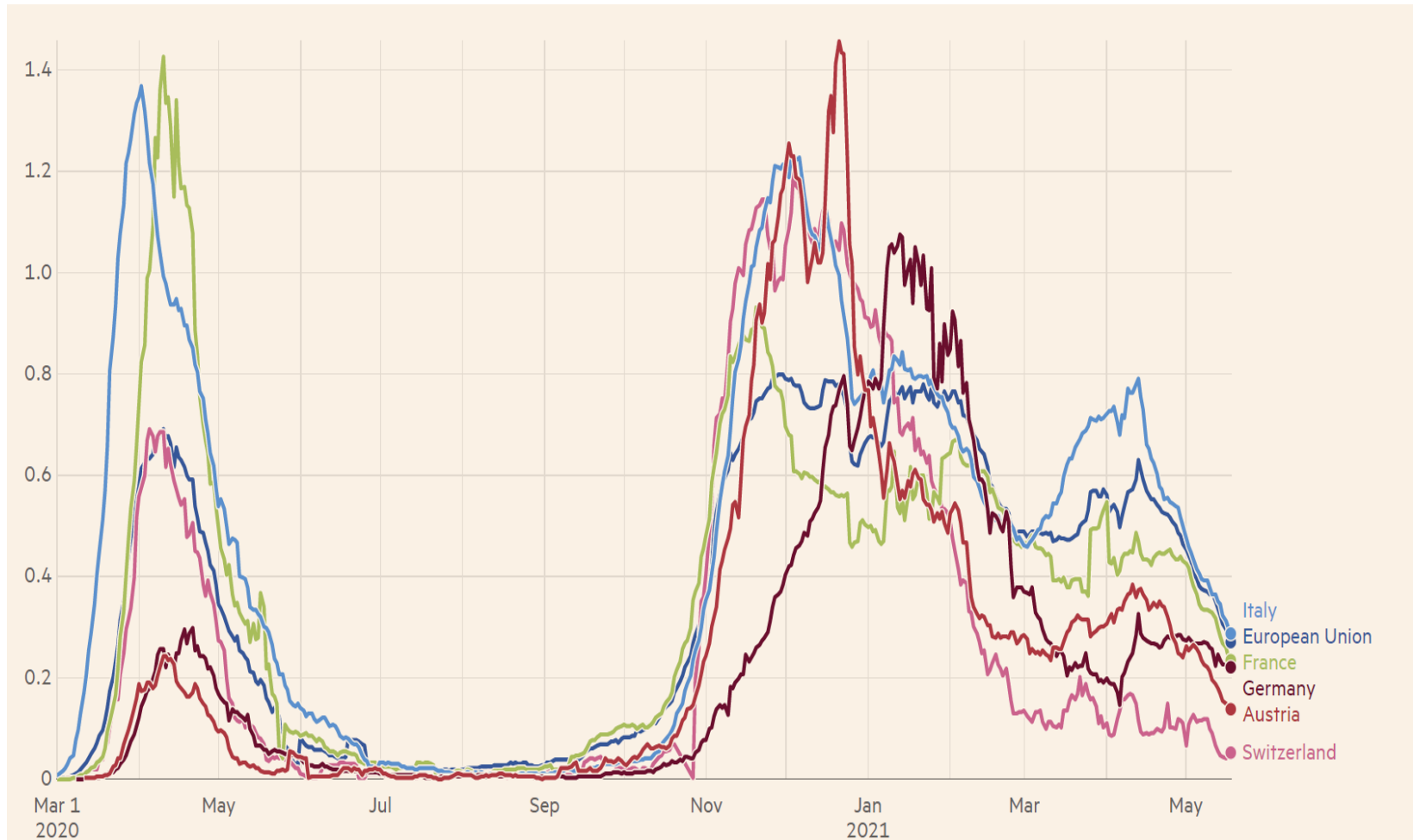


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# Introduction: COVID-19 in CH, new deaths/100k



Source: Financial Times analysis of data from the Johns Hopkins CSSE, the World Health Organization, the UK Government coronavirus dashboard, Public Health France and the Swedish Public Health Agency.

Data updated May 19 2021 1.07pm BST. Interactive version: [ft.com/covid19](https://ft.com/covid19)

FINANCIAL TIMES

# Research Question

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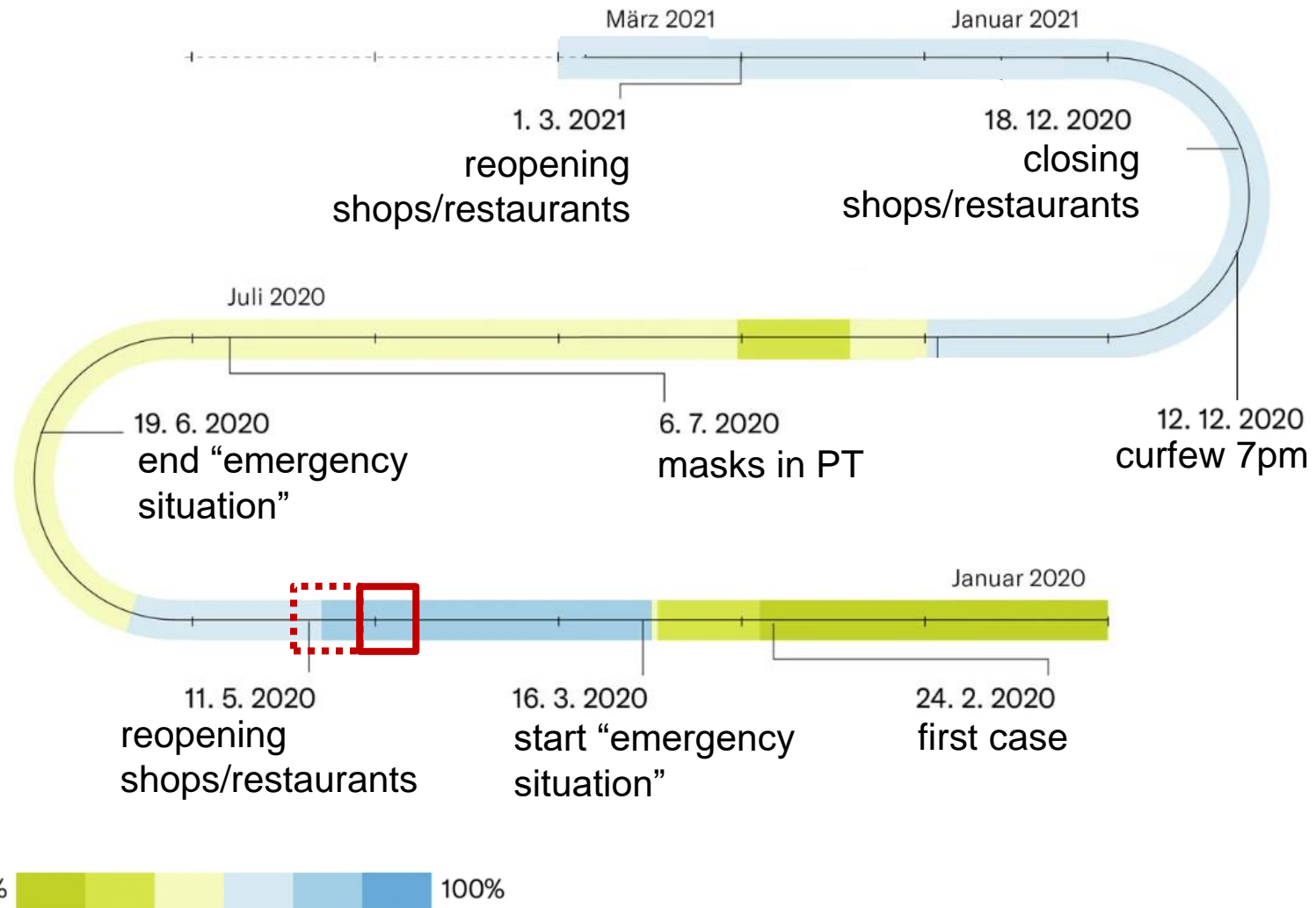
- March/April/May 2020: never-seen grocery shopping behavior and shopping conditions
  - Limited capacity, queues in front of grocery stores
  - Masks mandatory
  - Hoarding (noodles, toilet paper)
  - Home-delivery basically unavailable/overloaded in first weeks
- Hence of interest:
  - (How) will people try to hedge infection through online services?
  - Trade-off behavior regarding
    - Infection risk
    - Waiting time (queue)
    - Delivery cost/time

# Survey Method: Overview

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- Online survey: socio-demographics, shopping behavior, SC, attitudes towards risk & online-shopping
- SC experiment
  - In-store vs. online purchase of groceries\*
  - Two treatments: COVID with infection risk vs. pre-COVID
  - Within-subject design (both treatment conditions to each respondent)
  - Detailed explanation of risk & severity assumption
- Survey distributed 21<sup>st</sup> April 2021, 80% within first week, most restrictive lockdown measures
- Resulting dataset: 1009 respondents, 8072 choices

# Survey Method: Distribution Period



# Survey Method: Choicesets

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pre-COVID

Decision	Online	In-store
Shopping cost (CHF)	36	44
Shopping time (Min)	5	10
Travel cost (CHF)	-	4.5
Travel time (Min)	-	11
Delivery cost (CHF)	25	-
Delivery time (hours)	6	-

COVID

Decision	Online	In-store
Shopping cost (CHF)	72	80
Shopping time (Min)	20	30
Travel cost (CHF)	-	2.7
Travel time (Min)	-	6
Delivery cost (CHF)	50	-
Delivery time (hours)	24	-
Infection risk	-	high
Waiting time (Min)	-	0

# Survey Method: SC - Risk Attribute

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- Three scenarios based on epidemiological evidence as of April 2020
- Detailed explanation before SC-section in survey

	Low	Moderate	High
Situation in CH	Sporadic Cases	Cluster of cases	Community Transmission
Reported infections*	4,000	80,000	200,000
Reported recoveries*	500	4,000	80,000
Type of restrictions	none	reduced mobility	lockdown
<b>Risk of becoming infected</b>	<b>0.1%</b>	<b>1%</b>	<b>5%</b>



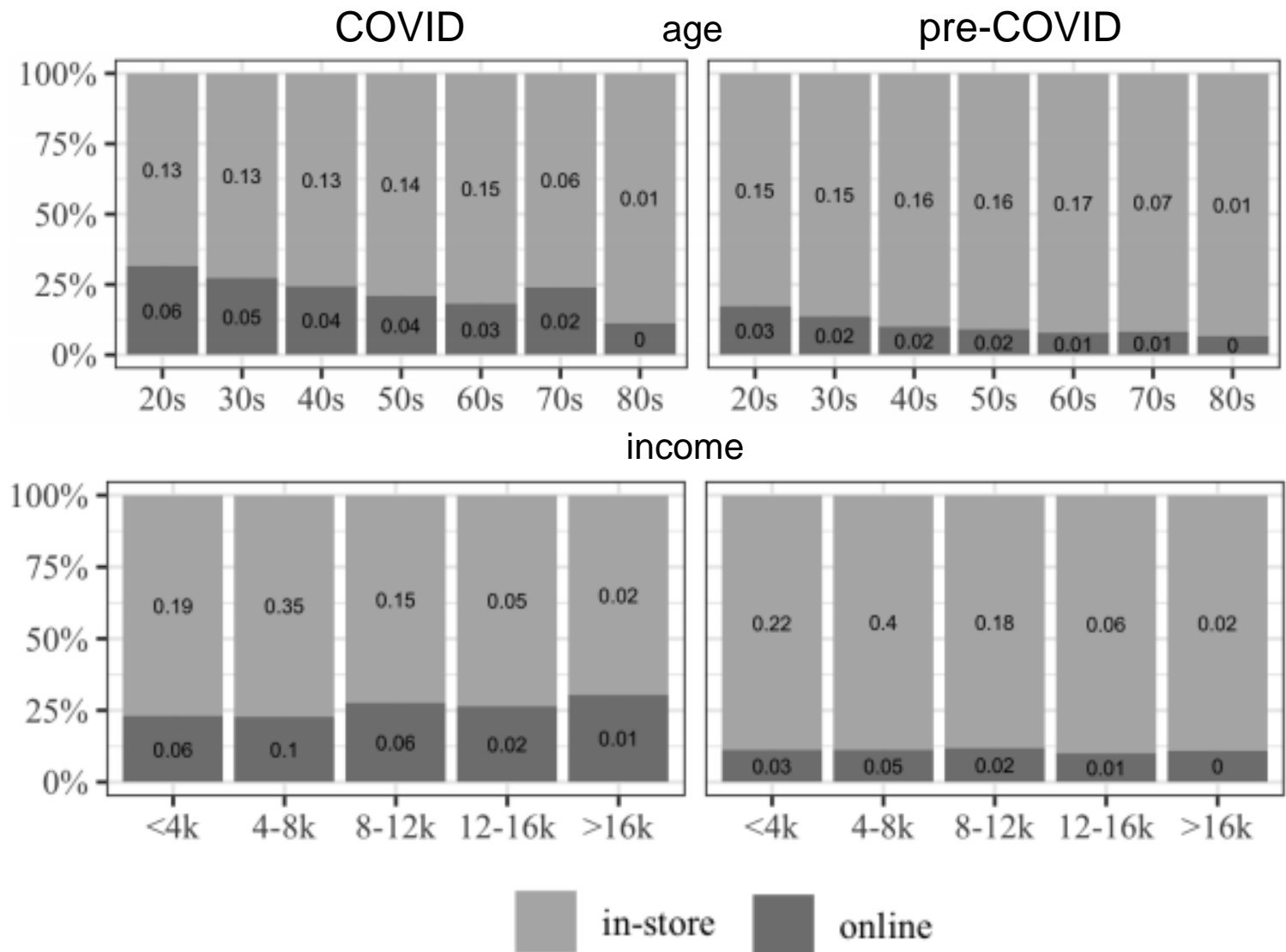
# Survey Method: SC - Risk Attribute

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- Three scenarios based on epidemiological evidence as of April 2020
- Detailed explanation before SC-section in survey

Asymptomatic/ mild symptoms flu-like symptoms (cough, headache, fever), (mild) pneumonia. No hospitalization necessary.	80%
Severe symptoms (severe) pneumonia, shortness of breath, low oxygen content in the blood. Hospitalization may be necessary (oxygen mask)	15%
Critical symptoms lung failure (artificial ventilation necessary, septic shock, (multiple) organ failure. Hospitalization necessary.	4.85%
Risk of death	0.15%

# Results: Descriptive Choice Behavior



# Results: Model Results 1

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- 6 model formulations, successive increase of complexity, risk-levels (low/medium/high) using dummy variables
- $MNL_{base} / MNL_{cs} / MNL_{soz}$ 
  - Travel-cost/time & shopping time insignificant
  - Base parameters intuitive signs with reasonable effect sizes, interaction parameters scattered
- Mixed Logit
  - Expected increase in model fit with random components (ASC & taste parameters)
  - Some parameters mostly explained by randomness, others lost significance, interaction parameters scattered
  - Expected effects of age & income; mostly on ASC
  - Clear effect of education on risk-valuation

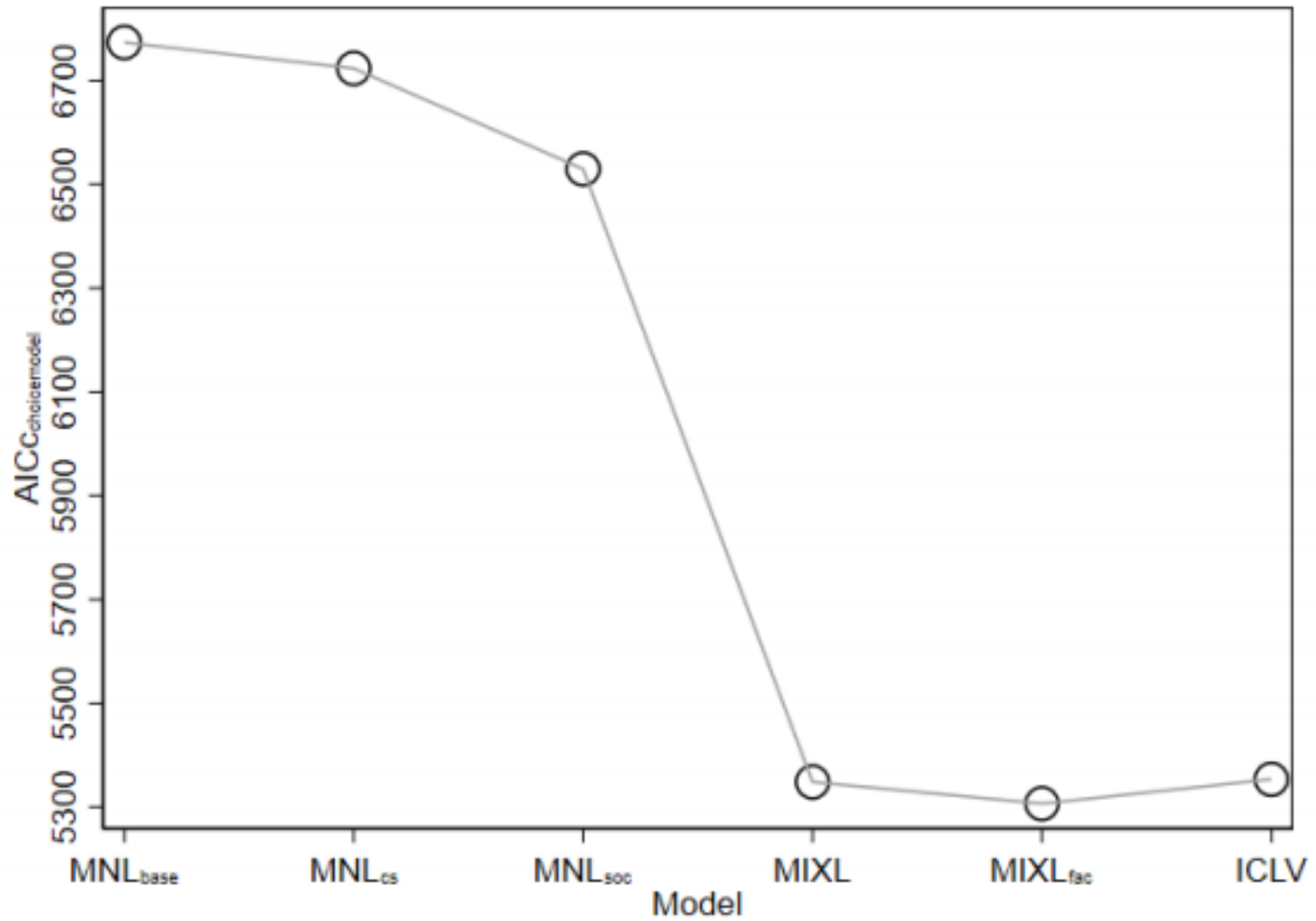
## Results: Model Results 2

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- Integrated LV model
  - Likert-scales to measure risk and online-shopping attitudes
  - Mixed Logit with LV factor scores to evaluate potential effects of LVs; risk factors showed no effect hence dropped
  - Coefficients in LV measurement model intuitive
  - Pro-online shopping LV only shows effect on ASC
- Resulting Insights
  - ASC (in-store alternative): -2.25
    - Age: -2.06
    - Income: +0.77
    - Pro-Online LV: +2.79
  - Risk-levels
    - Clear education effect through all levels

# Results: Model Results 3

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## Results: Partworth Analysis

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- Partworths measure actual importance within utility function using posterior distributions
- Marginal change only for shopping costs
- Delivery cost/time almost unchanged
- Low importance of risk-levels, waiting time no importance

attribute	relative partworths [%]	
	regular	pandemic
shopping cost	47.4	40.1
delivery cost	44.9	45.4
delivery time	7.7	5.9
waiting time		0.2
medium risk		1.6
high risk		6.8

## Results: WTP-measures

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- Based on generalized cost parameter using weighted average
- Considerable differences between model formulations
- VDTS similar to Schmid & Axhausen (2019)
- VSL: derived from WTP for risk-reduction, both levels result in approx. 800.000 CHF (compared to approx. 2.Mio CHF in other recent studies e.g. Chorus\*)

indicator/attribute		willingness-to-pay	
		$MNL_{soc}$	$ICLV$
delivery time (VDTS), regular	[CHF/day]	18.7	10.8
delivery time (VDTS), pandemic	[CHF/day]	18.0	7.4
waiting time	[CHF/h]	33.1	10.9
medium risk	[CHF]	28.6	11.1
high risk	[CHF]	152.0	63.4

# Critical review

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- Experimental framing with strong emphasis on pandemic context, transport-related attributes insignificant
- Complex incorporation of risk-levels (chained probabilities), communication and visualization not ideal
- Peer-review process:
  - RP over SP data if available
  - missing link to transportation field



Q&A

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