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Risk perception during COVID-19:

Are individuals more likely to order their groceries online during the pandemic?

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STRC

20th Swiss Transport Research Conference
Monte Verità / Ascona, May 13 – 15, 2020

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Introduction

- Switzerland has been under a “soft lockdown” since March 2020 to hinder the spread of COVID-19.
- While non-essential businesses remained closed until this week, grocery stores stayed open to the public.
- Visiting a grocery store in person implies risk of becoming infected.
- Online grocers and other delivery services have reported a marked increase in delivery demand since the outbreak of COVID-19.

Research Questions & Hypotheses

- Are individuals more likely to order groceries online in times of COVID-19 vs. before?
 - H: Yes, especially participants over 60 or who have a medical precondition, those living in an urban setting, single parents, as well as those with “pro-online” attitudes

- Are individuals willing to pay more to have groceries delivered to their homes rather than leaving the house to fetch them themselves during COVID-19?
 - H: Yes

Survey content for 1000 Swiss-German residents

- Internet access panel (Respondi)
- Socio-demographics (person, household, mobility)
- Health/COVID-19 related questions
- Shopping behavior, ICT behavior
- Risk behavior, fairness perception
- **SC experiment blocks**
 - 4 modes of travel x 3 basket sizes x 2 scenarios (corona vs. not corona) = 24 resulting combinations
 - 480 resulting choice sets (4 choice sets per block) with D-efficient designs (Ngene)
- Response burden \approx 13 minutes estimated response time

Background: Infection risk

| Situation in CH | Low | Moderate | High |
|----------------------------------|----------------|------------------|------------------------|
| | 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 |
| Risk of becoming infected | 0.1% | 1% | 5% |

* <https://covid19-scenarios.org>

Background: Probabilities for an average 43-year-old

| | |
|---|-------|
| 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% |

Method: Choice situations

Corona

| Entscheidung 1 | Online | Laden |
|-----------------------|---------------|--------------|
| Einkaufskosten (CHF) | 72 | 80 |
| Einkaufszeit (Min) | 20 | 30 |
| Wartezeit (Min) | - | 0 |
| Reisekosten (CHF) | - | 2.7 |
| Reisezeit (Min) | - | 6 |
| Versandkosten (CHF) | 50 | - |
| Lieferzeit (Stunden) | 24 | - |
| Infektionsrisiko | - | hoch |

Non-Corona

| Entscheidung 1 | Online | Laden |
|-----------------------|---------------|--------------|
| Einkaufskosten (CHF) | 36 | 44 |
| Einkaufszeit (Min) | 5 | 10 |
| Reisekosten (CHF) | - | 4.5 |
| Reisezeit (Min) | - | 11 |
| Versandkosten (CHF) | 25 | - |
| Lieferzeit (Stunden) | 6 | - |

Interim Results: Descriptive Analysis

| Variable | Value | (%, N = 824) |
|-----------------|-----------------------------|---------------------|
| Gender | Male | 48.66 |
| | Female | 51.33 |
| Age | 20-29 | 15.66 |
| | 30-39 | 18.93 |
| | 40-49 | 19.66 |
| | 50-59 | 22.21 |
| | 60-89 | 23.54 |
| Occupation | Employed | 63.71 |
| | Student/Apprentice | 4.25 |
| | Unemployed/Household duties | 12.14 |
| | Retired | 7.04 |
| Education | Compulsory Education | 4.37 |
| | Further Education | 65.17 |
| | University | 30.46 |

Interim Results: Descriptive Analysis

| Variable | Value | (%, N = 824) |
|--------------------------|----------------------|---------------------|
| Household Size | 1 | 37.5 |
| | 2 | 25 |
| | > 3 | 37.5 |
| Monthly Household Income | under 2'000 CHF | 6.55 |
| | 2'001 - 4'000 CHF | 16.75 |
| | 4'001 - 6'000 CHF | 24.51 |
| | 6'001 - 8'000 CHF | 20.39 |
| | 8'001 – 10'000 CHF | 13.11 |
| | 10'001 - 12'000 CHF | 8.98 |
| | more than 16'000 CHF | 2.67 |

Interim Results: Descriptive Analysis

| Variable | Value | (%, N = 824) |
|-----------------------------|----------------------|---------------------|
| Frequency Shopping Online | Never | 63.96 |
| | Once per week | 6.80 |
| | 2- 3 times per month | 7.28 |
| | Once a month or less | 7.28 |
| Frequency Shopping in Store | Once | 33.62 |
| | 2 – 3 times | 54.49 |
| | 4 Times or more | 11.89 |

Interim Results: Descriptive Analysis

| Variable | Value | (%, N = 6,551 Choices) |
|--------------------|--------------|-------------------------------|
| Choice, Corona | In-store | 75.5 |
| | <i>Men</i> | 48.1 |
| | <i>Women</i> | 51.9 |
| | Online | 24.5 |
| | <i>Men</i> | 55.7 |
| | <i>Women</i> | 44.3 |
| Choice, Non-Corona | In-store | 89.1 |
| | <i>Men</i> | 48.9 |
| | <i>Women</i> | 51.1 |
| | Online | 10.9 |
| | <i>Men</i> | 59.5 |
| | <i>Women</i> | 40.5 |

Interim Results: MNL

| | MNL Coef. |
|---------------------------------------|------------------|
| Shopping cost | -0.04*** |
| Waiting queuing time during Corona | -0.02*** |
| Infection risk during Corona in-store | -0.79*** |
| Delivery time non-Corona | -0.02*** |
| Delivery cost non-Corona | -0.04*** |
| Delivery cost during Corona | -0.03*** |
| ASC online during Corona | -2.62*** |
| ASC online non-Corona | -1.71*** |
| # estimated parameters | 15 |
| Number of respondents | 749 |
| Number of choice observations | 5691 |
| LL (null) | -3944.70 |
| LL (final) | -2211.84 |
| McFadden R2 | 0.44 |

Robust standard errors
 *** : $p < 0.01$ 13

Next steps for modeling

- MNL:
 - One model with 4 alternatives (online/Corona, online/non-Corona, in-store/Corona, in-store/non-Corona)
 - Interaction terms
 - Socio-demographics (especially age, urban/rural)
 - Mode vs. travel cost
 - Risk vs. in-store shopping time
- Mixed Logit (MIXL R package: taste heterogeneity, interaction effects)
- Hybrid Choice Model
 - Risk, shopping, fairness attitudes as a latent variable

Questions?

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References

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- Salathé, M., Althaus, C. L., Neher, R., Stringhini, S., Hodcroft, E., Fellay, J., ... & Eckerle, I. (2020). COVID-19 epidemic in Switzerland: on the importance of testing, contact tracing and isolation. *Swiss medical weekly*, 150 (11-12), w20225.
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Related literature:

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- Haridasan, A. C., & Fernando, A. G. (2018). Online or in-store: unravelling consumer's channel choice motives. *Journal of Research in Interactive Marketing*.
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Appendices

Appendix 1: Attributes Experimental Design

In-store

| SHOPPING COST | Levels (μ \pm 10%) | | |
|-----------------|---------------------------|---------|---------|
| small (1 day) | 36 CHF | 40 CHF | 44 CHF |
| medium (2 days) | 72 CHF | 80 CHF | 88 CHF |
| large (4+ days) | 108 CHF | 120 CHF | 132 CHF |

| SHOPPING TIME | Levels (μ \pm 5mins) | | |
|-----------------|-----------------------------|--------|--------|
| small (1 day) | 10 min | 15 min | 20 min |
| medium (2 days) | 25 min | 30 min | 35 min |
| large (4+ days) | 45 min | 50 min | 55 min |

| TRAVEL TIME | Levels (μ \pm 20%) | | |
|------------------|---------------------------|--------|--------|
| walk | 7 min | 10 min | 13 min |
| public_transport | 6 min | 9 min | 12 min |
| car | 5 min | 8 min | 11 min |

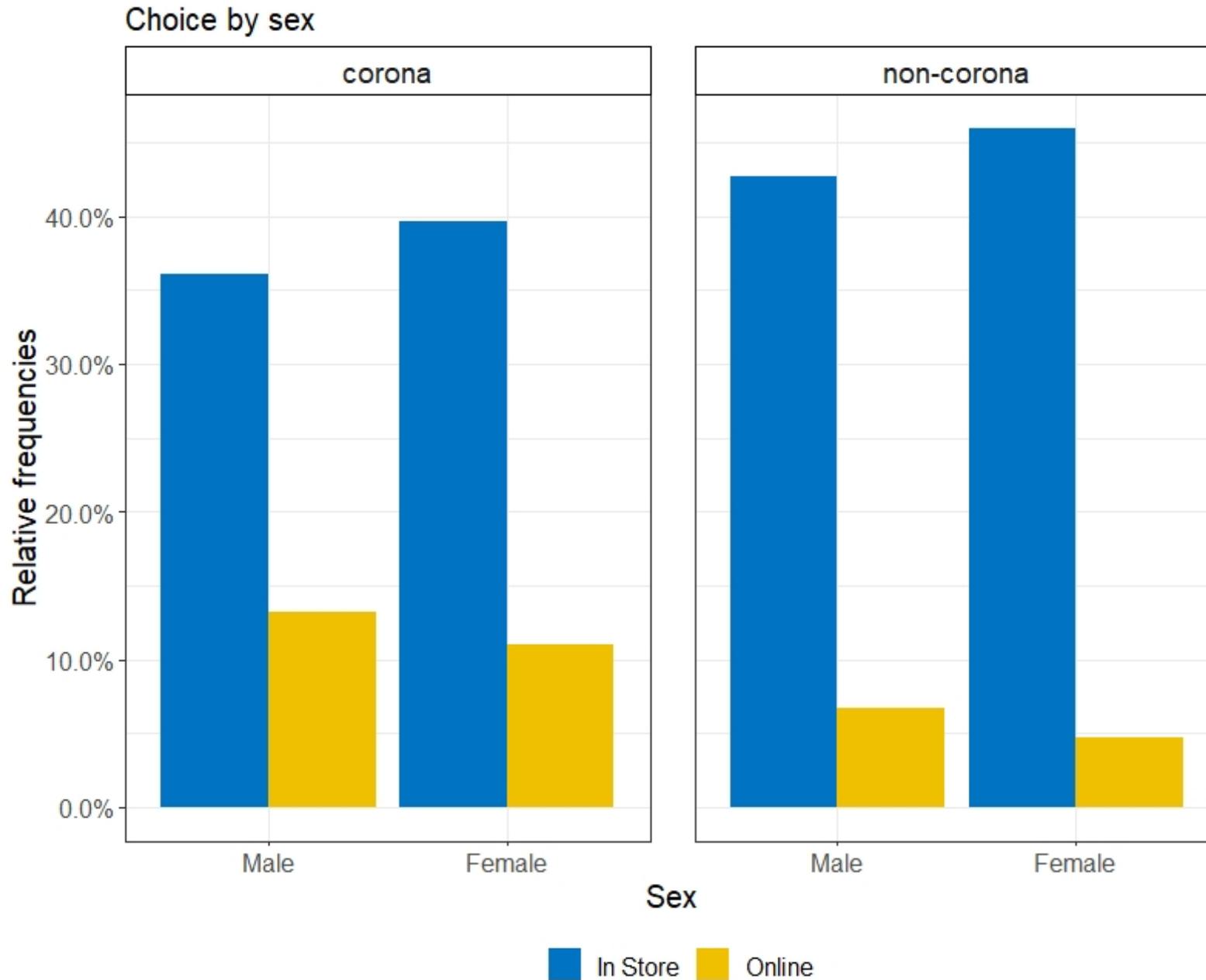
| TRAVEL COST | Levels (μ \pm 20%) | | |
|----------------------|---------------------------|---------|---------|
| walk | 0 CHF | 0 CHF | 0 CHF |
| public_transport abo | 0 CHF | 0 CHF | 0 CHF |
| public_transport | 2.7 CHF | 3.2 CHF | 3.7 CHF |
| car | 2.5 CHF | 3.5 CHF | 4.5 CHF |

Online

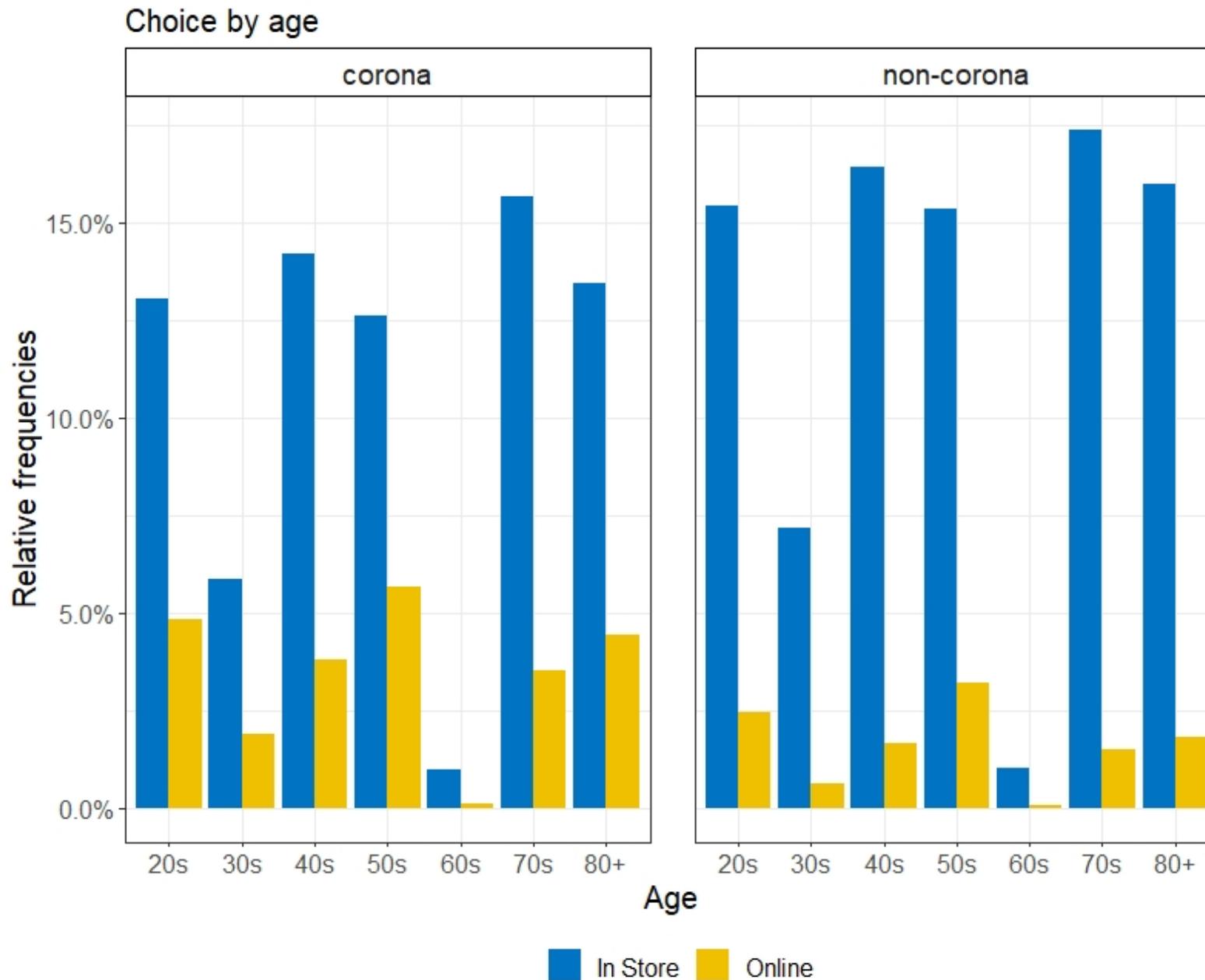
| Levels (μ \pm 10%) | | |
|---------------------------|---------|---------|
| 32 CHF | 36 CHF | 40 CHF |
| 65 CHF | 72 CHF | 79 CHF |
| 97 CHF | 108 CHF | 119 CHF |

| Levels (μ \pm 5mins) | | |
|-----------------------------|--------|--------|
| 5 min | 10 min | 15 min |
| 20 min | 25 min | 30 min |
| 40 min | 45 min | 50 min |

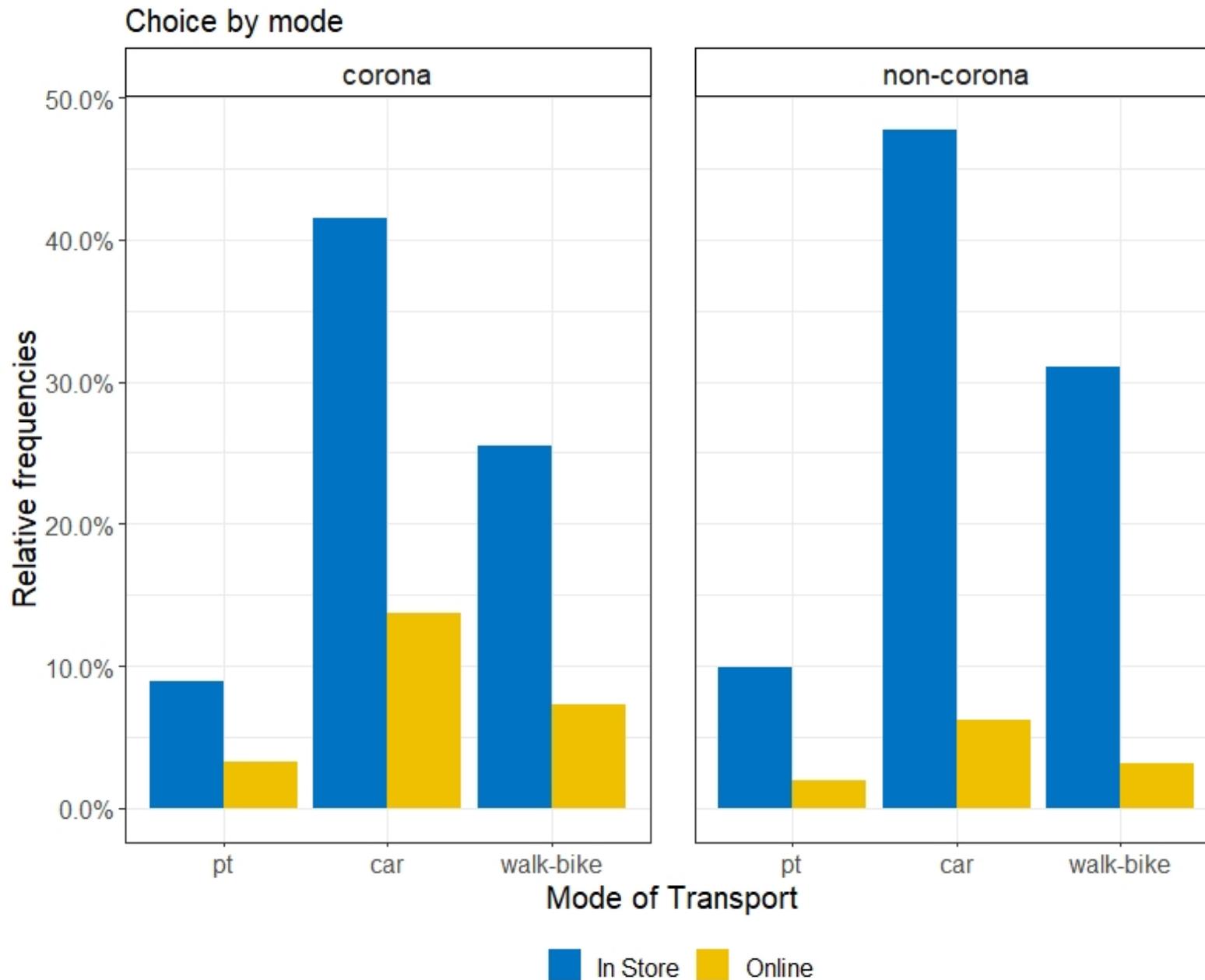
Appendix 2: Descriptive Analysis



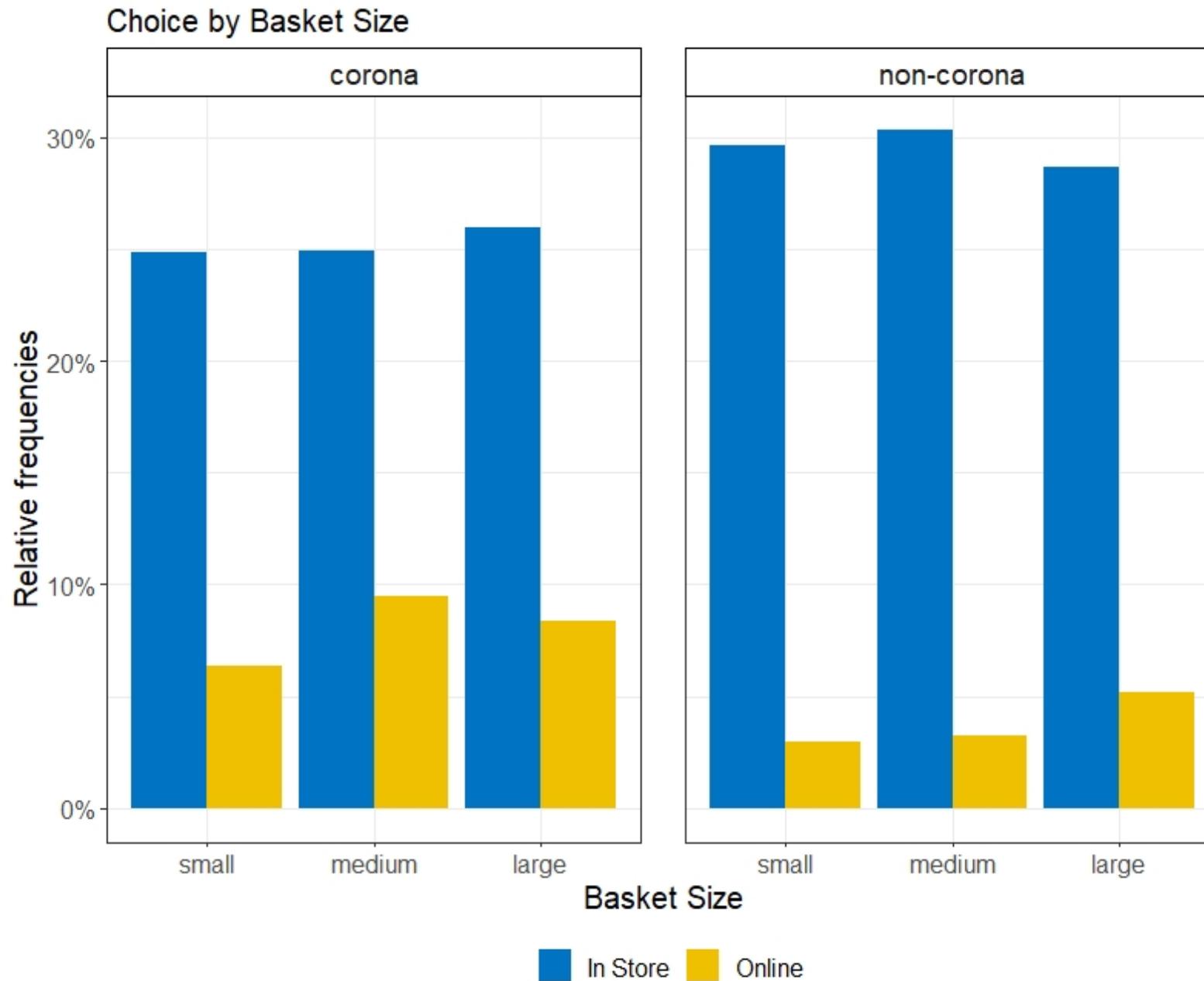
Appendix 2: Descriptive Analysis



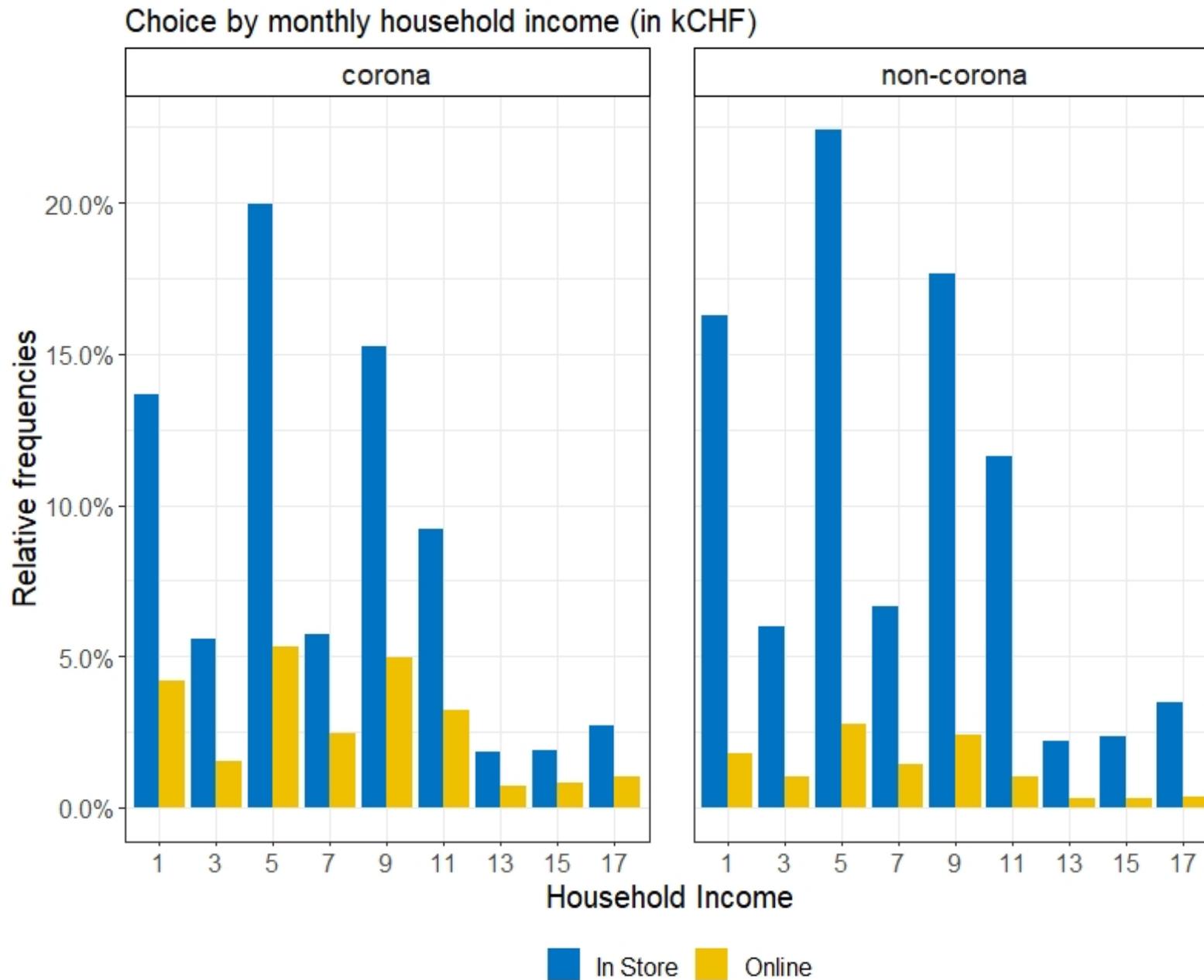
Appendix 2: Descriptive Analysis



Appendix 2: Descriptive Analysis



Appendix 2: Descriptive Analysis



Appendix 3: Interim Results – Complete MNL Output

| | MNL Coef. |
|---------------------------------------|------------------|
| Shopping cost | -0.04*** |
| Shopping time IN non-Corona | 0.00 |
| Shopping time IN during Corona | 0.00 |
| Shopping time ON non-Corona | 0.01 |
| Shopping time ON non-Corona | 0.00 |
| Waiting queuing time IN during Corona | -0.02*** |
| Infection risk IN during Corona | -0.79*** |
| Delivery time ON non-Corona | -0.02*** |
| Delivery time ON during Corona | 0.00 |
| Delivery cost ON non-Corona | -0.04*** |
| Delivery cost ON during Corona | -0.03*** |

Robust standard errors

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