Preferences for online grocery shopping during the COVID-19 pandemic - the role of concern and attitudes towards crowding

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Motivation

The online grocery shopping (**OGS**) sector has been steadily growing throughout the last decade

- Nonetheless, the growth was usually considered to be not as dynamic as in other similar sectors
- Pandemic has significantly changed this dynamic, by accelerating the development of online grocery services

At the same time the research regarding OGS has focused mostly on:

- Comparison of attitudes between traditional and online shopping
- Situational factors that drive individuals to start using OGS (e.g. having a baby)
- How people behave when shopping online

Limited effort to understand how attributes specific to OGS affect consumers' choices

- Delivery conditions
- Quality of the stock
- Fees

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- Delivery conditions
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- Fees

Choice experiment is a convenient tool to study trade-offs that individuals make between these attributes

Motivation

The emergence of COVID-19 has led to worldwide fear and anxiety, affecting individuals' mental health and general wellbeing

- There is a rich literature in consumer research on how fear may affect individuals' behavior
- Mostly related to so-called fear appeals

We built upon this previous work and investigate how individuals' attitudes that are related to coping with fear affect their preferences toward OGS

- We focus on attitudes related to problem-focused coping

Two types of behavior that individuals are likely to exhibit when facing a threat are protection and avoidance

- Protection means taking active actions against a given threat
- Avoidance means minimizing exposure to the given threat

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- Protection means taking active actions against a given threat → E.g., wearing mask
- Avoidance means minimizing exposure to the given threat → E.g., avoiding people

What we do?

We use choice experiment data regarding OGS

- Survey conducted in NYC during "*New York State on PAUSE*" executive order, at the beginning of the pandemic

We use hybrid latent class model to account for market segmentation and link consumers' preferences with fear-related attitudes

- Attitude towards active protection against COVID-19
- Crowds avoidance attitude
- We control for many socio-demographic characteristics (for example, health)

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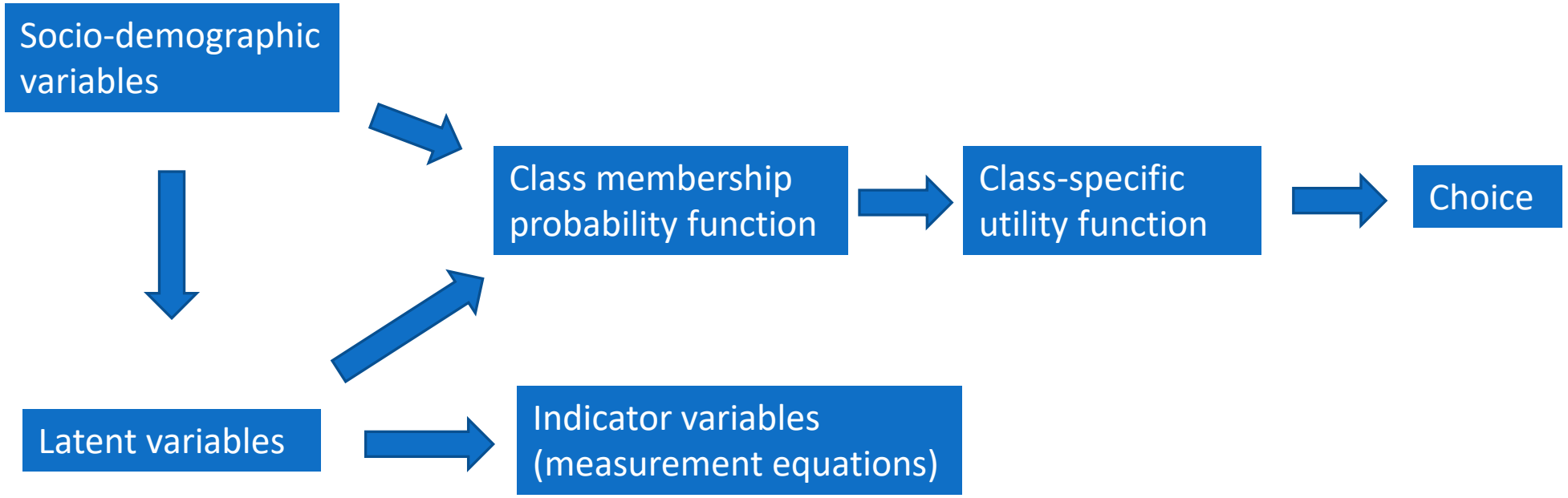
- We control for many socio-demographic characteristics (for example, health)

We expect positive effects of these attitudes on outcomes like WTP or opt-in probability

Econometric model

We employ a hybrid latent class model



Econometric model

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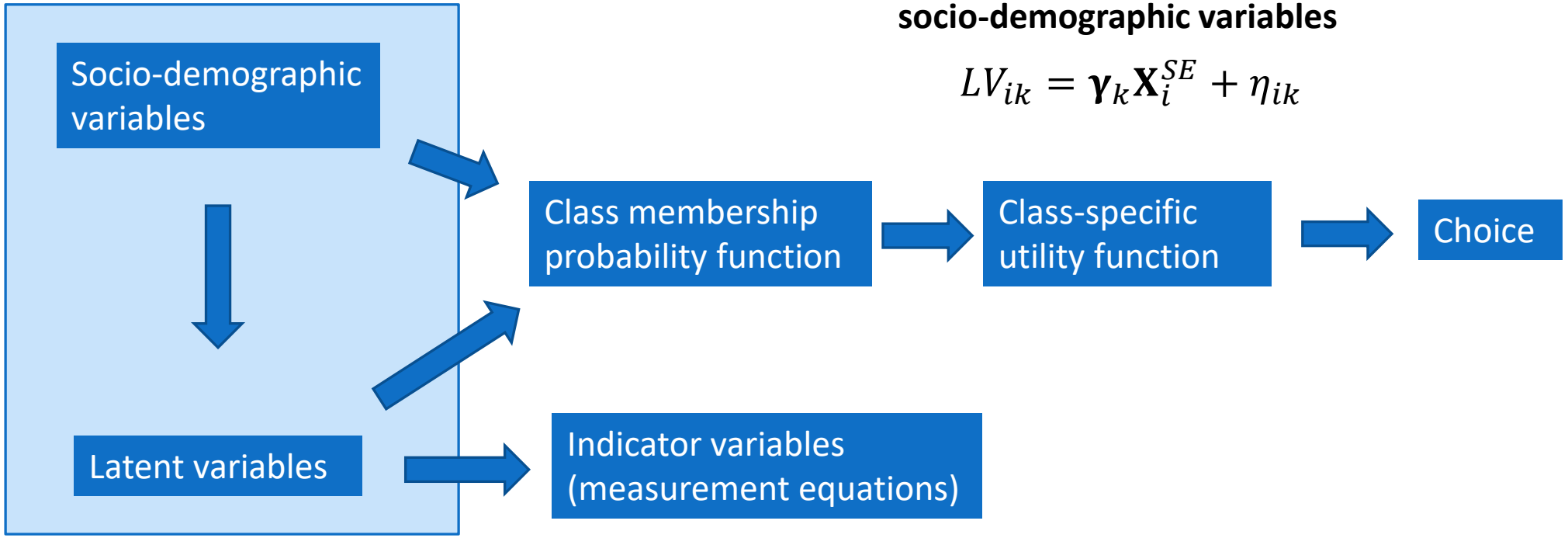
Latent variables are function of socio-demographic variables

$$LV_{ik} = \boldsymbol{\gamma}_k \mathbf{X}_i^{SE} + \eta_{ik}$$



Econometric model

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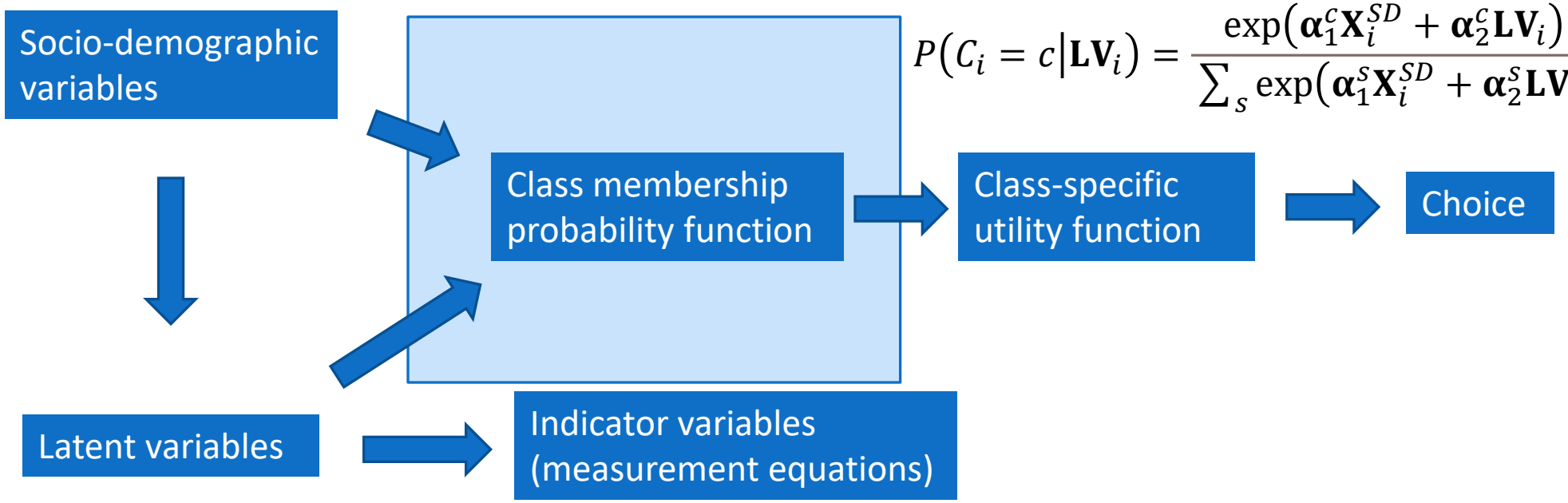
Class membership probability function depends on latent factors and socio-demographics

$$P(C_i = c|\mathbf{LV}_i) = \frac{\exp(\boldsymbol{\alpha}_1^c \mathbf{X}_i^{SD} + \boldsymbol{\alpha}_2^c \mathbf{LV}_i)}{\sum_s \exp(\boldsymbol{\alpha}_1^s \mathbf{X}_i^{SD} + \boldsymbol{\alpha}_2^s \mathbf{LV}_i)}$$



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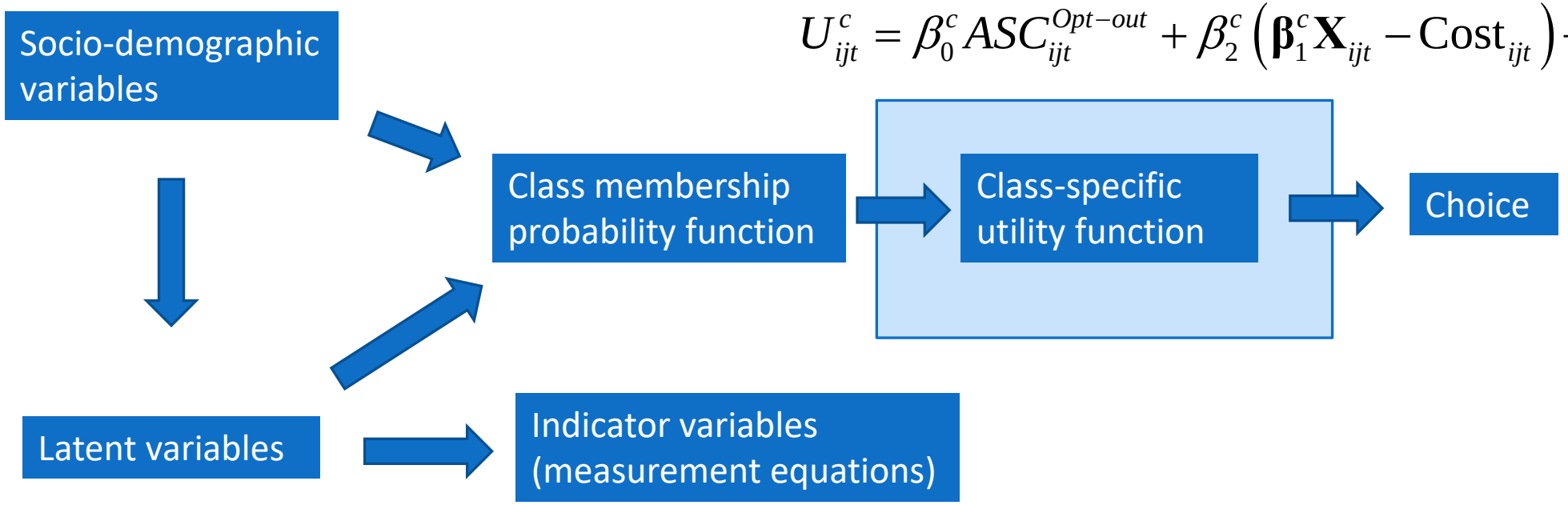
Utility function is in WTP-space, with class specific coefficients

$$U_{ijt}^{c} = \beta_0^c ASC_{ijt}^{Opt-out} + \beta_2^c \left(\boldsymbol{\beta}_1^c \mathbf{X}_{ijt} - \text{Cost}_{ijt} \right) + \varepsilon_{ijt}$$

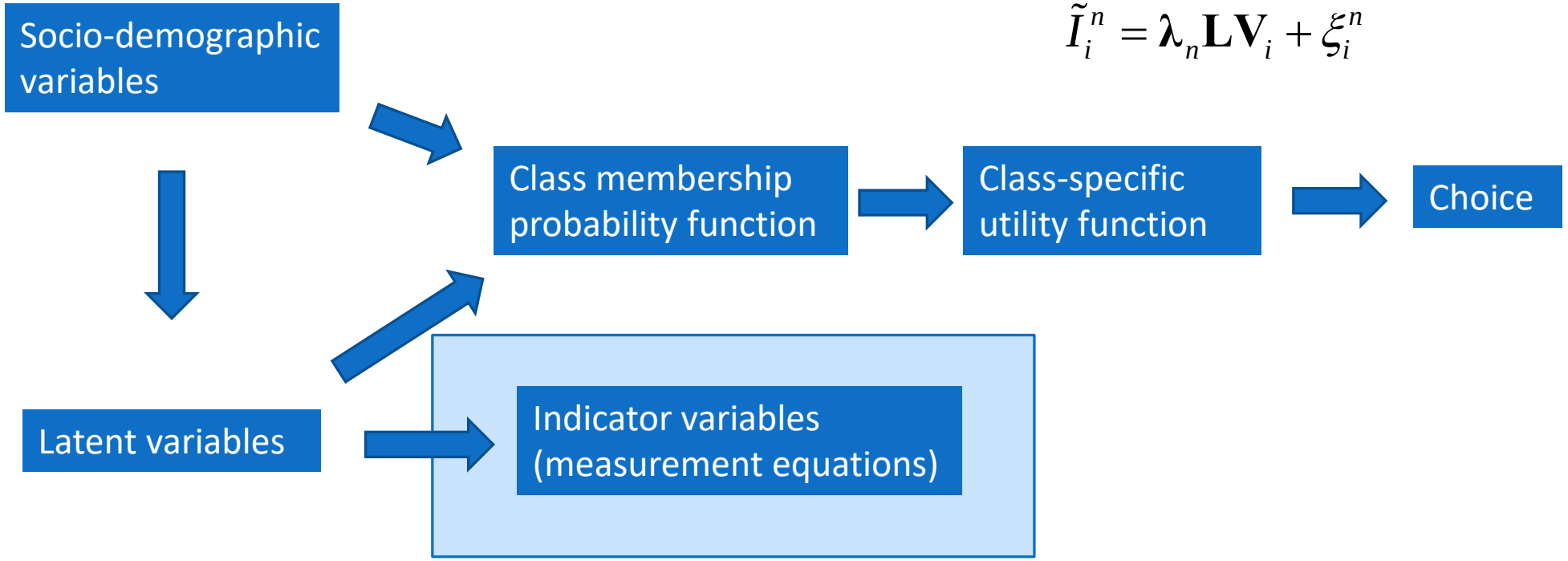


Econometric model

We employ a hybrid latent class model

Latent factors are identified by linking them with the attitudinal questions

$$\tilde{I}_i^n = \boldsymbol{\lambda}_n \mathbf{LV}_i + \xi_i^n$$



Data

Survey conducted in May of 2020 in NYC

The aim of the survey was to measure the disruption of the daily lives of NYC residents caused by the COVID-19 outbreak

- Part of the survey was concerned with OGS, including a CE
- 775 respondents in total

Choice experiment

- 2 alternatives + opt-out option
- Most respondents completed 7 choice tasks

Service A	Service B
Cost per delivery **$10**	Cost per delivery **$4**
Next available delivery timeslot in **3 days**	Next available delivery timeslot **Today**
Brand variety **High**	Brand variety **Low**
Organic Produce **not available**	Organic Produce **Available**
Online stock reliable High likelihood of getting what you ordered	**Online stock not reliable** Due to high demand, items may be unavailable
No-contact delivery **No**	No-contact delivery **Yes**
Likely delay in actual delivery **90 min**	Actual delivery **always at agreed timeslot**
Markup **5%**	Markup **15%**

Data

During the survey respondents were asked several attitudinal questions, which we use to identify latent factors:

Since the lockdown (NYS on PAUSE) to contain COVID-19, how often do you?

Practice social distancing indoor
Practice social distancing outdoor
Use hand sanitizer
Use disinfecting wipes
Wear mask indoor
Wear mask outdoor
Minimize in-person contact
Wash your hands
Tell others they should practice social distancing

How concerned are you about the coronavirus outbreak?

Please indicate your level of agreement with the following statements:

I avoid crowded places whenever possible

A crowded place doesn't really bother me

It is worth having to deal with a crowded store if I can save money on the things I buy

It is worth having to deal with a crowded store if I can find the things I need
I respect social distancing guidelines

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crowded

things I buy

crowded

d

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Indicators mostly related to using preventive measures to limit exposure to the virus:

Attitude towards active protection against COVID-19

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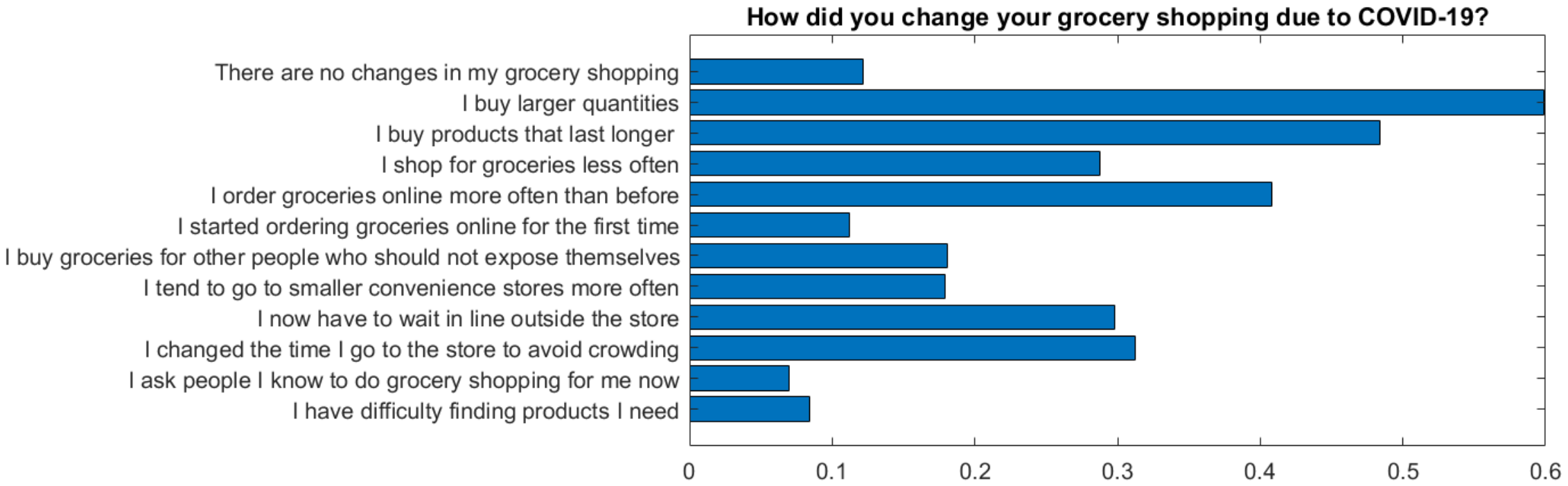
Indicators mostly related to avoiding crowds and limiting exposure to people:

Crowds avoidance attitude

Results

Changes to the grocery shopping behavior induced by COVID-19



Results – choice model

We identified 3 market segments with distinct preference profiles

- Model in WTP-space

	Class 1	Class 2	Class 3
Opt out ASC	-3.293***	0.658	-1.236***
Likely delivery delay	-0.049***	-0.116**	-0.045***
Next available delivery timeslot	-1.814***	-0.894	-1.382***
No contact delivery	5.650***	-0.237	5.181***
Brand variety medium	6.462**	-1.028	1.667
Brand variety high	11.730***	8.752**	5.128***
Organic produce	8.566***	2.564	3.638***
Stock reliable	6.904***	6.572**	4.331***
Mark up	-0.246**	-0.849**	-0.826***
Delivery cost	0.037***	0.214***	0.100***

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- Model in WTP-space

Consumers in Class 1 are most likely to opt-in for OGS

They also have the highest WTP for most attributes

They especially value brand variety and organic produce

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- Model in WTP-space

Consumers in Class 2 are the most likely to opt-out from OGS

They are also the most sensitive to delay and cost

	Class 1	Class 2	Class 3
Opt out ASC	-3.293***	0.658	-1.236***
Likely delivery delay	-0.049***	-0.116**	-0.045***
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Consumers in Class 3 are more likely to opt-in but less so than consumers from Class 1

Generally more cost sensitive which decreases their WTP

No contact delivery is relatively more important

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Opt out ASC	-3.293***	0.658	-1.236***
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Results – class probability

Several variables occurred significant for the class probability membership function

- Coefficients for the last class are normalized to 0

	Class 1	Class 2	Class 3
Constant	1.938***	-3.864***	0.000
Age	-0.008	0.056***	0.000
Did not use any online services	-0.924***	1.894***	0.000
How often have you gotten groceries online (Once or Never)	-0.867***	-0.827	0.000
Distance to grocery shop	0.081**	-0.021*	0.000
Self-reported health: Average or worse	-1.058***	0.287	0.000
Overweight	0.060	-0.748*	0.000
LV1 – active protection	0.324**	-0.322	0.000
LV2 – crowding avoidance	-0.597***	-0.301	0.000

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Class 2 (opt-out class) consists mostly of older consumers who have no prior experience with using OGS

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In Class 1 there is more individuals with some prior experience with OGS, in good health and leaving further way from the regular grocery shop

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Class 1 is also the one for which we observe significant effects of LVs

Individuals who actively protect themselves against COVID are more likely to belong to Class 1

We observe opposite effect for the crowds avoidance

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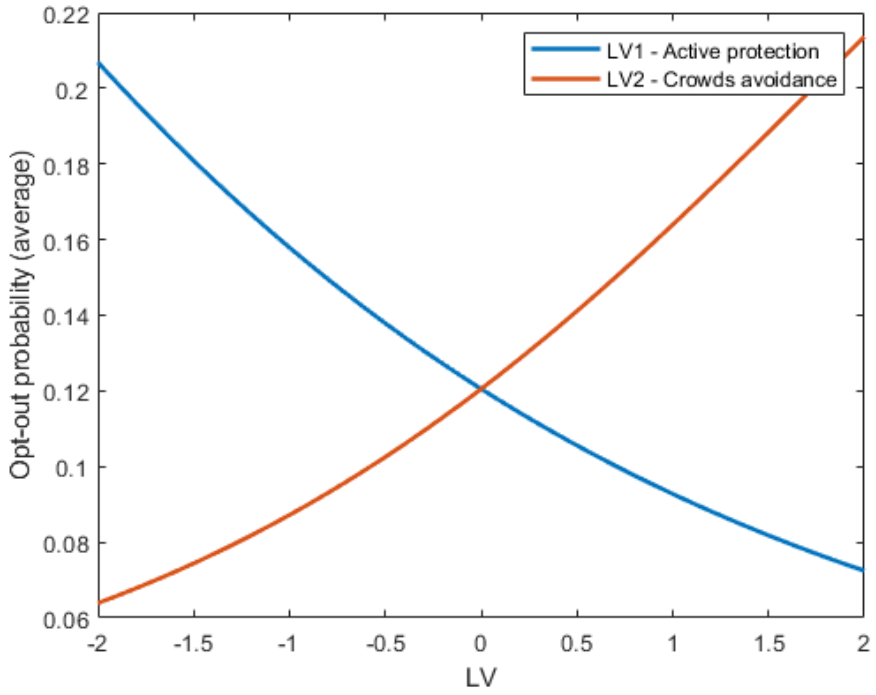
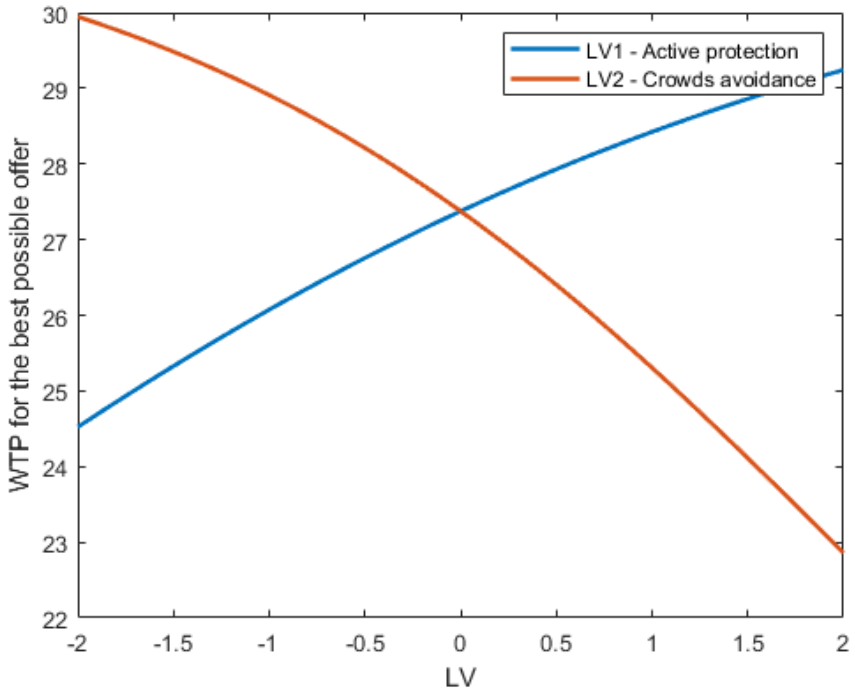
Results – latent variables

LV associated with active protection against COVID-19 decreases opt-out probability and generally increases WTP

- Crowds avoidance has the opposite effect

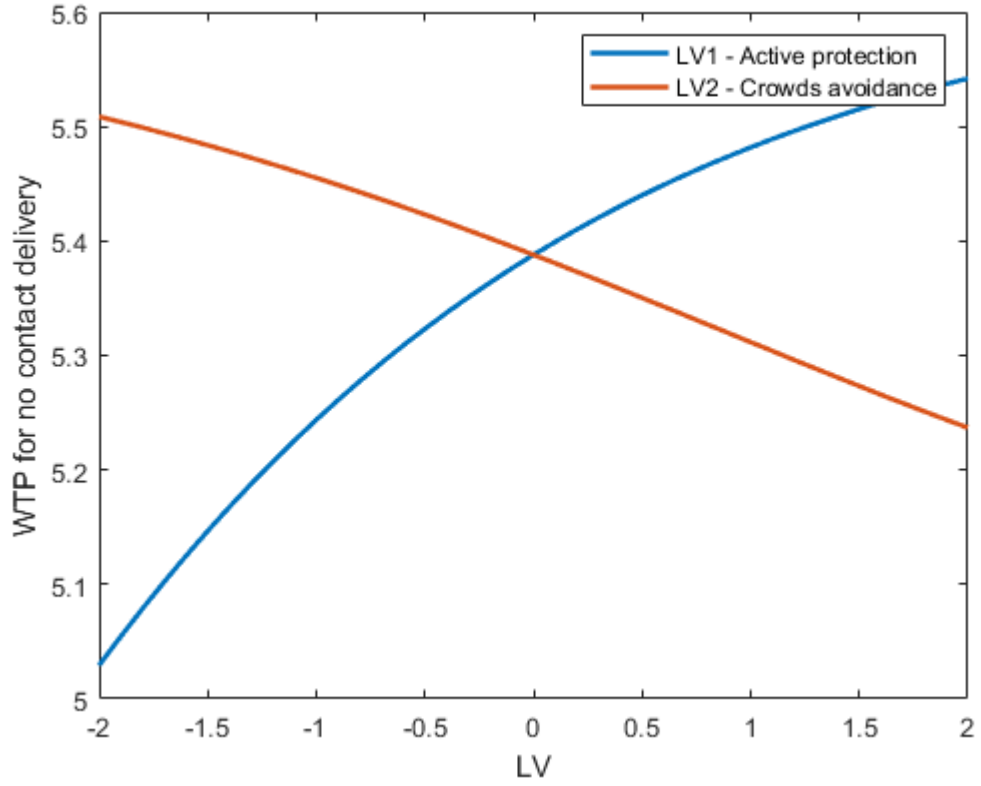




Results – latent variables

This is true even for the no contact delivery attribute

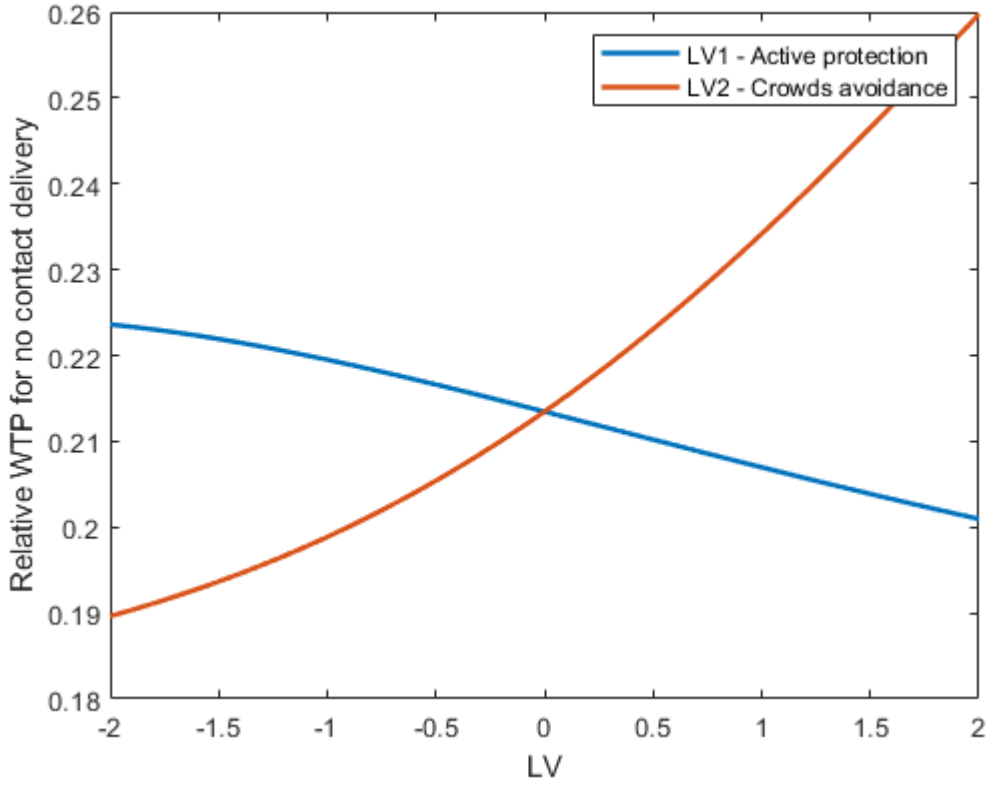
- Although this difference is likely not significant



Results – latent variables

Only when we look at the relative WTP for the no contact delivery we see that *Crowds avoidance* increases its relative importance

- By relative we mean WTP for no contact delivery divided by WTP for the best contract



Results – structural equations

Several variables significantly explain variation in LVs

- Individuals in good health and with children will protect themselves against COVID more often
- Older individuals, who are not overweight and who live closer to the grocery shop are more likely to avoid crowds

	LV1 – active protection	LV2 – crowds avoidance
Age	0.016	0.170***
No. of children	0.138***	-0.070
No. of elderly	-0.010	-0.119***
Did not use any online services	-0.092*	0.008
How often have you gotten groceries online (Once or Never)	-0.073	-0.020
Distance to grocery shop	-0.005	-0.118**
Self reported health: Average or worse	-0.097**	0.059
Overweight	0.012	-0.088**

Conclusions

We find that all considered attributes of OGS are important to the consumer to some extent

- We find significant preference heterogeneity, which indicates that retailers may want to tailor their OGS services to a particular segment
- Class 1 is less cost sensitive, but prioritizes the quality of the stock
- Class 3 is more cost sensitive, but cares less about the stock
- Class 2 is not likely to use OGS at all, although significant cost sensitivity reveals that “free delivery” promotions etc., may be important to reach this segment

We find that individuals who use active protection against COVID-19 have higher WTP and are more likely to use OGS

- Probably OGS is considered to be another way of protection

Contrary to our expectations, crowds avoidance generally decreases WTP

- Nonetheless, relatively, such consumers care more about no contact delivery