Estimating food delivery customers' willingness to pay for convenience to accelerate the usage of reusable packaging

Master thesis

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Abstract

5 % of total global greenhouse gas emissions occur through the production, use, and disposal of municipal solid waste (MSW) (Kaza et al. 2018). Countries spend millions on its correct disposal. Still, MSW ends up in nature and leads to health problems for humans and animals. The food delivery sector only accounts for a small share of MSW. However, it is a fast-growing sector, where solutions to reduce single-use packaging exist. This thesis analysed food delivery customers' willingness-to-pay (WTP) for a service where they order their food in reusable packaging and do not have to return it themselves. After finishing their meal, people instruct the Swiss Post to collect the reusable packaging in their letterbox. We calculated the mean WTP for such a service to be CHF 0.41. We identified the effort needed to return the packaging as the main hurdle to use reusable packaging. Thus, such a service has the potential to convince more food delivery customers to use reusable packaging for their meals. We assumed the CO_2 impact of the traffic to the customers' homes and back to be lower than using single-use packaging. Therefore, not only do more customers use reusable packaging, but also offering such a service mitigates CO_2eq emissions.

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Chapter 1

Introduction

According to the IPCC (2014), "municipal solid wastes (MSW) are the most visible and troublesome residues of human society". MSW is the waste originating from households, offices, small-scale institutions, and commercial enterprises. Principal constituents include metal, glass, inert materials, kitchen waste, electronic waste, plastic and rubber, paper and cardboard, and miscellaneous thrash (Nanda and Berruti 2021). According to Kaza et al. (2018), humankind generated 2.01 billion tons of MSW in 2016. This amount resulted in 1.6 billion tons of CO_2eq emissions, which accounted for around 5 % of global greenhouse gas emissions. The authors expect the amount to rise to 3.4 billion tons of CO_2eq emissions in 2050 if no improvements are made.

Globally, people dispose of 40 % of MSW in landfills, followed by recycling and composting (19 %), and incineration (11 %). The remainder, almost one-third, people openly dump and do not dispose of correctly (Kaza et al. 2018). This waste contaminates the oceans and leads to flooding, air and water pollution, and health problems for humans and animals (Hoornweg and Bhada-Tata 2012; Kaza et al. 2018). According to Engel et al. (2016), the costs of uncollected household waste in China, Indonesia, the Philippines, Vietnam, and Thailand amounted to 375 US$ per ton. A study by Berger and Sommerhalder (2011) estimated that collecting littered waste in Switzerland induced annual costs of 200 million CHF in 2011. MSW causes massive costs for its correct disposal, and if it is disposed of incorrectly, it causes huge costs for nature and the economy. Therefore, the IPCC (2014) states that "the top priority in post-consumer waste management should be reduction before re-use and recycling."

A large amount of MSW is packaging waste. In Europe, packaging represented 35 % of the total MSW in 2019 (Eurostat 2021, 2022). In the same year, citizens of the European Union used 18 billion single-use food containers (Zero Waste Europe 2022). Morales-Caselles et al. (2021) counted and sorted waste in different ocean environments. Food containers and cutlery were the second most occurring type with 9% of total ocean waste.

One sector producing packaging waste through the use of single-use food containers is the food delivery sector. Between 2017 and 2021, the value of this sector more than tripled and was worth 150 billion US$ (145.5 billion CHF)[1] (McKinsey 2021). In Switzerland, the market obtained a value of 2.1 billion CHF in the same year and grew by 65 % since 2018 (Just-eat Takeaway.com 2021a). In Australia, the three largest delivery companies, with a combined market share of 99.5 %, passed 27.6 million orders and produced 1,488 tons of packaging waste in 2018. This was on average slightly more than one order and 50 g of waste per inhabitant. (Arunan and Crawford 2021). In Switzerland, the market leader "Just eat Takeaway.com" passed 500,000 orders in January 2020 (Just-eat Takeaway.com 2021a). For the whole year of 2020, the number never decreased (Torcasso and Güntert 2021). The food delivery sector is responsible for only a small amount of MSW. Still, in this sector, solutions to reduce the amount of packaging waste exist.

This solution is reusable packaging. The customers' demand for such packaging increases. Studies by Jiang et al. (2020), Merlino et al. (2020) and Neill and Williams (2016) show that customers are willing to use reusable packaging for food delivery meals or milk. Moreover, customers even have a positive willingness-to-pay (WTP) because they obtain a positive utility knowing that they have reduced packaging waste.

In April 2022, the Swiss company reCIRCLE made it possible to use their reusable packaging (reCIRCLE BOX) for food delivery meals via a smartphone application (reCIRCLE AG 2022). Customers receive their reusable packaging without paying for it in advance. They have to return the packaging within seven days. Otherwise, reCIRCLE charges them CHF 11.[2] To return the packaging, the customers have two possibilities. They return it themselves to a reCIRCLE partner restaurant, or they return it via the Swiss Post. When ordering the meal, customers can instruct the Swiss Post to collect the reusable packaging at the customers' letterbox. After the testing stage, customers will have to pay for the

1 We used exchange rates from Fxtop.com (2022) and Finanzpartner.de (2022)

2 For food delivery, they are charged CHF 10 for the reCIRCLE BOX and CHF 1 for credit card transaction fees if they do not return the packaging.

pick-up service. With this service, reCIRCLE intends to offer a simple way of returning the packaging for potential customers not willing to return the packaging by themselves.[3]

Figure 1.1: The reCIRCLE BOXes (Rothenbühler 2022)

Not only waste is mitigated by using reCIRCLE BOXes. Bouchet and Boucher (2021a) conducted a life cycle assessment of the reCIRCLE BOXes. When reused 200 times, the reCIRCLE BOXes reduce around 100g of CO_2eq emissions released into the atmosphere every time the packaging is used.

Bouchet and Boucher (2021b) analysed the emissions of a reCIRCLE BOX transported 15 km to an industrial washing machine and back by freight truck.[4] This is the rightmost bar in figure 1.2. Because of the transport, the impact of the reCIRCLE BOX is slightly worse than washing at the restaurant, but still considerably better than using single-use packaging. The Swiss Post uses e-scooters to collect the packaging and collects them while distributing parcels and letters (Die Post n.d.). The additional emissions occurring through collecting the reCIRCLE BOXes are limited because often the driving route does not increase at all. We expect that the Swiss Post causes some emissions and more than returning the packaging by foot or bicycle, but less than single-use packaging. From an environmental viewpoint, we see the Swiss Post's service as a sensible return option.[5]

3 People could also pay the deposit plus the transaction fee and keep the packaging. However, some people might not want to keep it, especially frequent food delivery users. At some point their cupboard would be full of reCIRCLE BOXes. Also, this would not be environmentally-friendly. Therefore, we did not include this option in the questionnaire and the thesis.

4 The emissions were calculated assuming one reCIRCLE BOX is transported with a 3.5-7.5t freight truck (A.Bouchet, personal communication, September 21, 2022)

5 We would have to calculate the exact environmental impact in detail for accurate results.

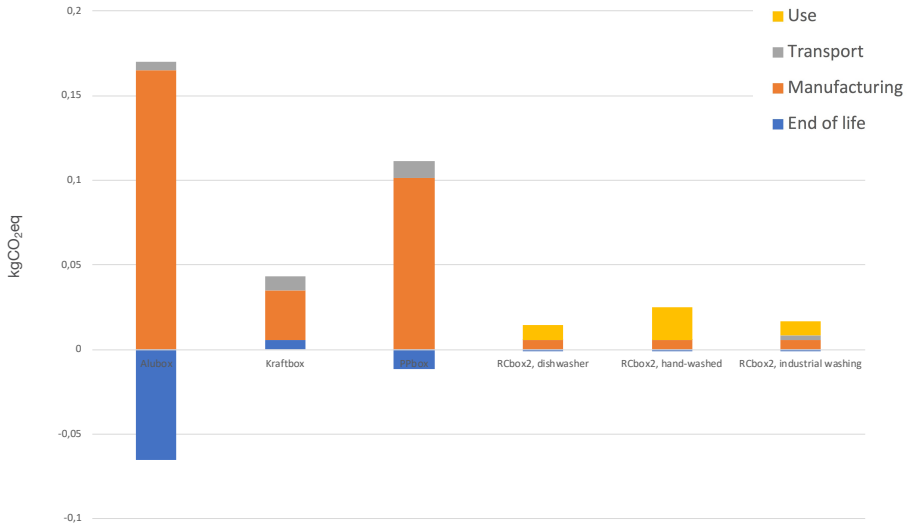

Figure 1.2: Life cycle assessment of three single-use packaging types (Cases 1 - 3) compared with the reCIRCLE BOX (Cases 4 - 6). The emissions are separated for use, transport, production, and end-of-life. The emissions (In $kgCO_2eq$) of one packaging are depicted (Bouchet and Boucher 2021b)

The topic of this master's thesis is the Swiss Post's pick-up service. We want to find out whether such a service is actually needed, or if people prefer returning the packaging themselves. Moreover, we want to estimate the customers' WTP for this convenient return option.

A study by Schuermann and Woo (2022) analysed the WTP for a reusable packaging scheme in the food delivery sector in Seoul, South Korea. One scheme, where customers had to return the packaging themselves and one, where the packaging was picked up at the point of delivery. The estimated difference in the mean WTP between the two scenarios was 0.26 US$ (CHF 0.26). Thus, the respondents were willing to pay this amount of money to not have to return the packaging themselves.

To the best of our knowledge, no other similar studies on this topic have been conducted yet. However, in e-commerce, studies have been conducted looking at customers' WTP for home delivery of groceries. In those studies, customers have the choice between fewer opportunity costs of time but with direct costs (Home delivery) and more opportunity costs of time, but without shipping costs (Pick-up at the store). Those options resemble the subject of this thesis. Milioti et al. (2020) estimated that customers' WTP in the UK for the home delivery of food worth 60 € (CHF 65) was 6.46 € (CHF 6.42), instead of travelling 3 kilometres to the grocery store. Meanwhile, WTP to walk to a pickup point 500m away from home was 1.65 € (CHF 1.68). In Greece, the WTP in the same study was

3.64 € (CHF 3.93) for home delivery and 1.69 € (CHF 1.83) to collect the parcel at the pick-up location. In a study by Seitz et al. (2017), 84.5 % of the respondents in Germany said they would pay money for the home delivery of groceries. For the pick-up of the prepacked order at the grocery store, only 36.7 % of the respondents would pay money. Thus, people are willing to pay money for convenience.

The results of Milioti et al. (2020) indicate country-wise differences. For the success of the Swiss Post's service and reusable packaging for food delivery, we need to know the customers' WTP for retracting the packaging in Switzerland. To estimate the WTP, we developed a questionnaire using the contingent valuation (CV) method. We then distributed the questionnaire using non-probability sampling.

This thesis is structured the following way: Chapter 2 explains the CV method in detail. Afterwards, chapter 3 presents how we developed the questionnaire and how we collected the data for the estimation of the WTP. Subsequently, chapter 4 analyses the data collected by the questionnaire and presents the results. Thereafter, chapter 5 discusses the results. The thesis ends with chapter 6, where we resume the main findings of this thesis.

Chapter 2

Methodology

2.1 Objectives

MSW contributes to climate change. To reduce its impact, reducing the amount of waste should be the main priority. In the food delivery sector, reusable packaging can achieve this goal. The Swiss Post's service could be part of this solution as it reduces the effort needed to return the packaging. The main objective of this thesis is to estimate customers' WTP for this pick-up service of the Swiss Post. However, to analyse how important and attractive the service is, we need to answer several other questions:

- Do customers perceive reusable packaging as environmentally-friendly?
- What are the hurdles for customers ordering their meals in reusable packaging?
- Do the customers prefer using the Swiss Post's service or do they prefer to return the packaging by themselves?
- What is the WTP for the Swiss Post's service?
- Which demographic characteristics influence the WTP?
- Does the respondents' ecological behaviour influence the WTP?
- Are people, already using reCIRCLE products, willing to pay more for the service?

The questionnaire includes specific questions trying to answer the questions above. Chapter 5 resumes the objectives of this thesis. It discusses whether it is possible to answer those questions and resumes the results of respondents' WTP.

2.2 Contingent valuation

2.2.1 The method

Stated preference approaches ask respondents contingent or hypothetical questions about the trade-off between the improvement of a good or service and the successive loss of money. With the responses, researchers gather information about preferences and the WTP (Haab and McConnell 2002). CV is the most prevalent stated preference method. Environmental economists widely use this method to measure the use and non-use values of public goods (Carson and Hanemann 2005). Krutilla (1967) defined non-use values as the value someone places on a good only because it exists even if the person will never use this good. For example, people fund specific projects to preserve exotic species without ever visiting them in the wilderness (Krutilla 1967).

The Swiss Post's service is a club good. People can be excluded from using the service. But the service is non-rival, as long as collecting reusable packaging does not exceed the Swiss Post's capacities. To calculate the WTP, the non-users and how they value the service are irrelevant. Even if they value the service, they will never have to pay for it. Either they do not order delivery food or they order but not in reusable packaging.

Even though the non-use values are irrelevant in this thesis, we used the CV method as it yields several benefits. First, it obtains information, where data about consumer behaviour does not exist yet. Second, it creates scenarios, where new goods or changes in existing goods are provided that are outside of the consumer experience (Carson and Hanemann 2005). Third, it yields incentive-compatible results. Respondents answer the hypothetical questions in the same way, as they would act in reality (Cummings et al. 1995). Carson and Hanemann (2005) state that people answer the WTP question only truthfully when it is in their economic interest. Hence, CV questionnaires are incentive-compatible if respondents consider the questionnaire as consequential and expect the project to be implemented.

A potential disadvantage is the warm-glow effect. Respondents attempt to please the interviewer by agreeing or disagreeing to pay a certain payment. In reality, they would act differently (Carson et al. 2001). This problem especially prevails in doing in-person interviews. Still, Arrow et al. (1993) concluded that a well-conducted CV questionnaire prevents the hypothetical settings disadvantages and provides reliable results.

2.2.2 Guidelines of a CV questionnaire

Carson et al. (2001) proposed the following setup for a CV questionnaire:

- An introductory section helping to set the general context
- A detailed description of the good
- The setting of how the good will be provided
- Information on how the good will be paid for
- A method of how the survey elicits the respondents' preferences
- Debriefing questions, why respondents answered the WTP question the way they did
- The collection of a set of potential influencing variables such as attitudes, debriefing questions and demographic information

Arrow et al. (1993) complied a set of guidelines defining an ideal questionnaire:

- Use a conservative design of the survey.
- Use probability sampling for the target sample.
- Provide sufficient information about the program.
- Include a No-answer option for the WTP question.
- Remind the respondents of substitute commodities.
- Present the WTP question as a vote on a referendum.
- Face-to-face interviews usually provide the best results.
- Pretest the questionnaire, photographs, and for interviewer effects.
- Minimise non-responses, as otherwise, survey results are unreliable.
- Conduct the survey at a sufficiently distant time from the environmental accident.
- Report the target population, sampling frame, sample size, non-respondent rate, and item non-response.
- Minimise measurement noise depending on time by averaging over several independently drawn samples.
- Use the WTP format over the willingness to accept format, as the former leads to more conservative results.
- Include a set of other questions (e.g. income, distance to the site), such that the response to the WTP question can be interpreted using those answers.

The questionnaire does not need to satisfy all guidelines, but its unreliability increases with more departures. Chapter 3.5 discusses whether those guidelines are met.

2.2.3 The WTP question

The fundamental part of the CV questionnaire is the WTP question. There, respondents decide between the improvement of a good or service and the consequential loss of money. We used the single binary choice format to estimate the WTP. We presented the respondents only one question about how they value the Swiss Post's service.

This approach yields a huge drawback. It is not incentive-compatible in all situations for non-public goods (Carson and Groves 2007). Respondents should always opt to pay for the Swiss Post's service. The results would show that WTP was high and everybody wanted to use the service. Of course, reCIRCLE would then provide it. Afterwards, respondents could still decide not to use the service if their WTP was lower than the payment for the service. By agreeing to use the service in the hypothetical scenario, respondents still have all options in reality. Yet, according to Carson and Groves (2007), researchers can restore incentive compatibility for non-public goods. They should only interview potential users who are given the choice between two alternative configurations but desire the good at no cost. They need to have the impression that if they exaggerate their WTP, they lose the other alternative which in reality they prefer.

2.3 The random utility model

With the single binary choice format, the only information about the WTP available is whether it is lower or higher (respectively equal) than a certain threshold. This information exists for several respondents. Using the random utility model for parametric models, it is possible to calculate the WTP. In this thesis, we followed the explanations of Haab and McConnell (2002), where the exact procedure can be found.

The WTP in the linear random utility model can be written as follows:

$$WTP_j = \alpha_1 z_j/\beta + \varepsilon_j/\beta \tag{2.1}$$

where α is the vector of parameters, z_j is a vector of variables related to individual j, β is the marginal utility of income and ε_j is the error term, a component of preferences of the respondent not known to the researcher.

The error term ε_{ij} is independently and identically distributed with a mean of zero. For this distribution, either a probit ($\varepsilon_j \sim \mathcal{N}(0, \sigma^2)$) or a logit approach ($\varepsilon_j \sim \mathcal{N}(0, \pi^2\sigma_L^2/3)$) can be used. In equation 2.2, there are three potential sources for variation:

- Uncertainty from the randomness of the preferences. ε_j/β has mean zero and variance ω^2/β^2.
- Uncertainty from the randomness of the parameters, as the parameters are maximum likelihood estimates and thus are asymptotically distributed.
- Variation over all individuals of the sample, depending on their set of characteristics.

Because of this uncertainty, only the median and mean WTP can be calculated. In the linear random utility model, both are equal and are calculated as follows:

$$E_\varepsilon(WTP|\alpha, \beta, z_j) = \frac{\alpha z_j}{\beta} \tag{2.2}$$

In a sample, usually, the mean of the z_j is used, which leads to the following equation to calculate the mean and median WTP:

$$E_\varepsilon(WTP|\alpha, \beta, \bar{z}) = [(\alpha/\sigma)/(\beta/\sigma)]\bar{z} \tag{2.3}$$

This linear model assumes a constant marginal utility of income. Earning an additional CHF has the same impact on the decision of paying for a good or service independent of the person's income. Haab and McConnell (2002) present transformations, such as the log-linear, the box-cox transformation, and the varying parameter specification. The first two approaches assume a decreasing marginal utility. The higher the income, the lower the impact earning an additional CHF has on the decision to use the service. The varying parameter specification assumes that the marginal utility varies across income groups. People with an income between CHF 3,000 and 4,000 have a constant marginal utility. This marginal utility differs to people with an income of CHF 8,000 to 9,000.

To find the best model, we compared them using "Akaike's Information Criterion" (AIC) and the "Likelihood ratio test". The AIC analyses the trade-off between the loss of information if a variable is omitted with the benefit of having fewer variables in the model. The "Likelihood ratio test" analyses whether a restricted model, where variables are omitted, accurately represents the full model (Haab and McConnell 2002).

Chapter 3

Data

3.1 The questionnaire

The introduction explained the aim of this thesis and presented the reusable packaging, the reCIRCLE BOXes. It included a picture, such that respondents recognised them if they did not know it by its name before. This part asked two short questions: whether the respondents ever ordered delivery food and whether they knew the reCIRCLE BOXes.

Part two gathered data about potential influencing factors of the respondents' WTP. We asked three delivery-related questions if respondents had ever ordered delivery food: the frequency of orders, their preferred provider, and the average number of meals per order. If respondents had never ordered delivery meals, we asked them why they had never done that. Afterwards, they had to rate the statement that reusable packaging is more environmentally-friendly than single-use packaging. Using a 5-point Likert-Scale, they could choose one of five options ranging from this applied "Not at all" to "Completely". Furthermore, this part asked which packaging respondents use for takeaway food and how often they use the reCIRCLE BOXes. We asked questions about their ecological behaviour: how often do they eat meat, how often they eat animal byproducts, whether they buy biological products and if they buy local products. The respondents ranked their behaviour on a 5-point Likert-Scale from "Never" to "Always". Additionally, we asked the respondents which out of eight items they recycle. Lastly, we asked if they would order a parcel to their home with costs or if they would pick it up at the supermarket. This question aimed to detect people with low opportunity costs of time. The next part

explained how respondents could order delivery food in reusable packaging. We asked respondents if they had already ordered delivery food in reusable packaging. Subsequently, this part asked whether respondents could imagine doing so and why, respectively, why not. This question detected potential users of the service.

Eventually, the respondents arrived at the most essential part of the questionnaire, the hypothetical valuation scenario. We asked them to select their preferred option between returning the packaging themselves for free and using the Swiss Post's service with costs. The WTP question had to be incentive compatible. We told the respondents that if they chose the service of the Swiss Post, they might lose the possibility to return the packaging themselves, and vice versa. Therefore, if the service was implemented, they might be stuck with their less-preferred option. Furthermore, the respondents did not have the incentive to understate their WTP because the service could not be implemented at all. Based on the guidelines of Arrow et al. (1993), the question included a "No-answer" option and the respondents were asked to justify their choice. According to Venkatachalam (2004), the lowest value of WTP should have close to a 100 % approval rate. Meanwhile, the highest value should have close to a 100 % rejection rate. Thus, we chose prices from CHF 0.2 and CHF 10. The questionnaire presented any of those prices randomly to the respondents.

In the last part, we asked demographic questions to detect more potential influential factors for the WTP. Appendix A.1 presents the full questionnaire.

3.2 The sampling technique

To restore incentive compatibility, researchers should only interview potential users (Carson and Groves 2007). Thus, our population of interest were people ordering delivery meals willing to order them in reusable packaging. The project of reCIRCLE for food delivery only just launched. There were too few people already ordering their food delivery meals in reCIRCLE BOXes. Therefore, we did not have access to the target population. Moreover, we did not find any information about this population. It was also impossible to know in advance which respondents belong to the target population. Given the lack of information and access, we used non-probability sampling to conveniently find as many potential users as possible. We distributed the questionnaire as an online survey. Respondents were obliged to further distribute it.

In non-probability sampling, some biases might occur because respondents were not chosen randomly. The two main issues are selection bias and non-coverage bias (Statistics Canada 2021). The former occurs, when the sample and the population differ systematically (Tripepi et al. 2010). The latter occurs if some part of the population does not have any chance of being represented in the target sample (Statistics Canada 2021). Another bias, which could become an issue is the sample non-response bias. This bias occurs, when non-response rates differ strongly between different subgroups.

3.3 Data collection

Before distributing the questionnaire, we tested it by conducting five in-person interviews. This ensured that respondents comprehended all texts and questions, understood the pictures, and the questionnaire would miss no essential questions. To distribute it, we mainly used the resources of reCIRCLE. reCIRCLE posted it on the social media platforms Instagram and LinkedIn. For the delivery project, reCIRCLE works with the Swiss Post and the Hochschule Luzern. Those two organisations distributed it as well on LinkedIn or internal platforms. Moreover, reCIRCLE held a presentation at the University of Bern in the course "Nachhaltigkeit in Organisationen", where we asked the students to complete the questionnaire as well. Moreover, we sent it to family and friends.

The distribution started on the 27th of April 2022. Respondents could use the QR-Code or a web link to get access to the questionnaire. Therefore, respondents needed internet access to complete the questionnaire.[1] To incentivise people to complete the questionnaire, one person could win a CHF 30 gift card for a food delivery provider of their choice. On the 22nd of June 2022, we stopped collecting data.

3.4 Data treatment

To analyse the data, we used the program "The R Project for Statistical Computing" (Short R). We followed the procedure of Haab and McConnell (2002). The answer to whether respondents would use the Swiss Post's service was the dependent variable. We

1 To order meals in reusable packaging, customers need an application. Thus, they also need internet access. The online questionnaire excludes no potential users.

coded this variable as a dummy variable. Most independent variables, we coded directly based on respondents' answers. Those variables were either dummy or numerical variables. Based on the postal code of the living addresses, we created two new variables: How many reCIRCLE partner restaurants have the same postal code as the respondents' living addresses, and to which region the respondents' living regions belong. Based on data from Bundesamt für Statistik (2017), the options were "City", "Urban" and "Countryside". The aim of the first variable was to examine whether the number of return stations is relevant for the WTP. The second variable aimed to detect possible differences based on the living area.

3.5 Quality of the questionnaire

Chapter 2.2.2 presents several guidelines on how a good CV questionnaire should look. Most guidelines for a well-conducted value-elicitation survey hold. Chapter 3.2 already discussed the advantages and disadvantages of non-probability sampling. Additionally, the results from the online survey might not have been as good as other techniques. We preferred the former because the latter would have been much more time-intensive. Because there were no environmental accidents related to the topic, this guideline was trivial. We could not gather information about non-response because respondents were asked to further distribute the questionnaire. Measurement noise depending on time could also become an issue, as the results relied only on one sample. The set-up of the questionnaire followed the proposal of Carson et al. (2001). We tried to ensure that the service itself, how the service was provided and the payment vehicle were well and comprehensibly explained. To ensure a conservative design, we did not present information about the environmental benefits of reusable packaging and the impact of the Swiss Post's service.

Chapter 4

Results

4.1 Respondent treatment

199 people started completing the questionnaire. Ultimately, we used the answers of 191 respondents. Four respondents did not finish the survey. Two respondents gave incorrect answers regarding their age or their postal code. One respondent wrongly proposed that paying for the Swiss Post's service should better be independent of the number of reCIRCLE BOXes returned, which was exactly the case. Lastly, one respondent wrote to be responding randomly to all questions. To restore incentive compatibility, only potential users should be interviewed (Carson and Groves 2007). Thus, we excluded people not using food delivery services at all or not interested in using reusable packaging for food delivery. We classified 179 respondents as potential users.

For some questions, respondents could submit open answers. We analysed their answers and assigned them to the best-fitting group of the existing answer options. We adapted 21 answers from four questions in this way.[1]

4.2 Variable treatment

We constructed several variables to analyse the WTP for the Swiss Post's service. Some answers from the questionnaire could be directly transformed into variables. However, the majority of answers we had to transform, or even construct new variables.

1 Question number 3, 14, 29 and 30 in Appendix A.1

We evenly weighted the answers about meat consumption, animal byproduct consumption, local products, and biological products and recycling behaviour to construct the variable "Environmental score". All other variables, we created using the answers to only one question. We either created a numerical or a dummy variable. As previously explained in Chapter 3.4, we created two variables based on the postal code. In the end, we used a total of 19 variables to analyse the WTP for the Swiss Post's service:

Nr.[2]	**Variable name**	**Question**	**Values**
2	Knowing	Do the respondents know reCIRCLE	1 = "Yes", 0 = "No"
3	Service	The preferred food delivery service	1 = "Just eat", 0 = All other answers
4	Persons	The number of person respondents usually order delivery meals for	1 - 5 (The answer "More than four" was classified as 5)
5	Frequency	The frequency, respondents order delivery meals	365 = "Daily", 156 = "Several times a week", 52 = "Once a week", 12 = "Once a month", 6 = "Less than once a month", 1 = "Once a year"
7	Single-use	Do the respondents think, reusable packaging is more environmentally-friendly than single-use packaging	1-5 (The higher the number, the more they agree with the statement)
8	Packaging	The type of packaging respondents use for takeaway food most often	1 = "reCIRCLE BOXes" or "Other reusable packaging", 0 = All other answers
9	reBOX	The frequency of using reCIRCLE products	365 = "Daily", 156 = "Several times a week", 52 = "Once a week", 12 = "Once a month", 6 = "Less than once a month", 1 = "Once a year", 0 = "Never"
10-14	Environmental score	A score related to environmental behaviour and recycling	A number between 0 - 1
15	Opportunity costs	Would the respondents send a parcel to Migros or directly to their home	1 = "Collect" and "Don't Know", 0 = "Send home"
16	Already	Did the respondents already order delivery meals in reusable packaging	1 = "Yes", 0 = "No"
21	Yesno	Would the respondents use the Swiss Post's service	1 = "Yes" and "Don't Know", 0 = "No"

2 Appendix A.1 presents the exact questions relating to this number

21	Bid	The value of the presented bid in the WTP question (As a negative value)	-0.2, -0.5, -1, -2, -3, -4, -5, -10
25	Age	The age of the respondents	A numerical value
26	Partners	The number of reCIRCLE partners in the living area	A numerical value
26	Domicile	The domicile type of the living area	1 = "City", 0 = "Urban" and "Rural"
27	Gender	The respondents' gender	1 = "Female" and "Other", 0 = "Male"
28	Income	The respondents' income	"500"-"12,500" (The average of the income group was taken as a value (e.g. 2,500 for 2,000-2,999). More than 12'000 was treated as 12,500.)
29	Graduation	The respondents' highest graduation	1 = "University", "Doctorate" and "Applied university", 0 = All other answers
30	Profession	The respondents' current profession	1 = "Working people", 0 = "All other options"

Table 4.1: All variables, the question the variable is based on, including the question number, and the values the variable can take on

4.3 Descriptive analysis

4.3.1 Answers for the WTP Question

We classified 179 respondents as potential users. In the WTP question, we asked every respondent to select one of the two return options. For every respondent, one valuation scenario was randomly presented. Table 4.2 presents how often each scenario was used:

CHF 0.2	CHF 0.5	CHF 1	CHF 2	CHF 3	CHF 4	CHF 5	CHF 10
23	30	21	26	23	20	18	18

Table 4.2: Frequency of a valuation scenario in the WTP question

The majority of the respondents preferred to return the packaging themselves for free. 114 respondents (63.5 %) favoured this option. 48 respondents (27 %) preferred the Swiss Post's service. The remaining 17 respondents (9.5 %) could not choose an option. Figure 4.1 depicts the distribution separated for the eight valuation scenarios:

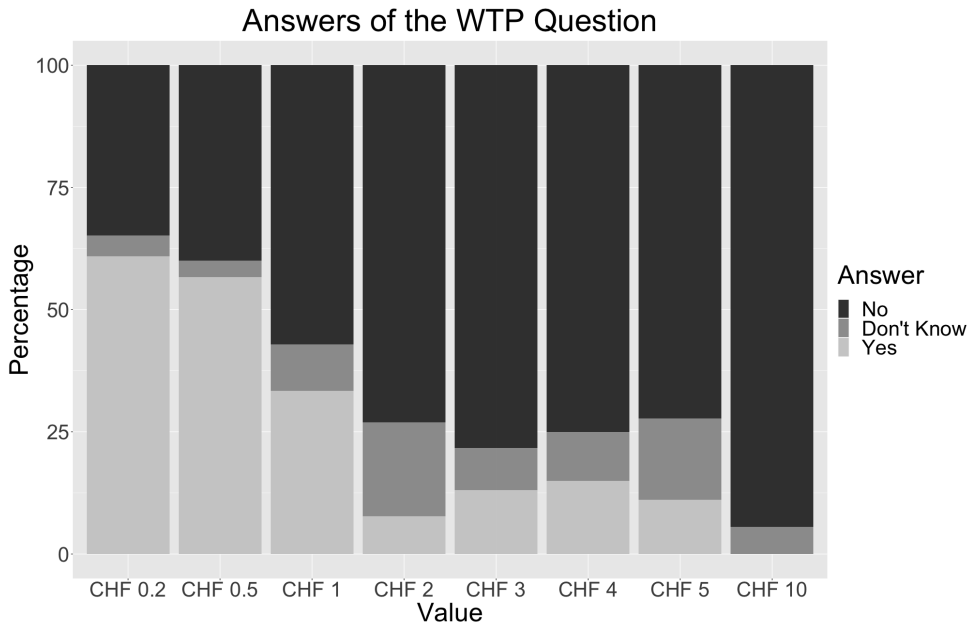

Figure 4.1: Answers to the WTP question separated for different payments

The preference for the Swiss Post's service was the highest for the lowest payment. In this case, 61 % preferred the service. As the payment rose, the approval rate decreased. This trend stopped after a payment of CHF 2. For payments up to CHF 5, the approval rate was higher than for CHF 2. For a payment of CHF 2, many respondents were indecisive. Thus, the percentage of respondents preferring to return the packaging themselves was only higher for CHF 5. For a payment of CHF 10, all respondents bar one would return the packaging by themselves, and nobody would use the Swiss Post's service.

We invited the respondents to justify their choice. They could submit multiple answers. Appendix A.2 presents all results. 94 % of the respondents favouring the service preferred it because it is more comfortable. 29 % did not know where the closest partner lies and 14.5 % live far away from a reCIRCLE partner. Of the people rejecting to use the service, 62 % did so because they live close to a partner. 38 % of those respondents were not willing to pay the payment they were confronted with, and 46.5 % did not want to pay anything at all. Four people mentioned ecological concerns because of the traffic by the Swiss Post. Within the unsure respondents, only to one person, the WTP question was unclear.

4.3.2 The independent variables

We built a total of 18 independent variables. Table 4.2 from the previous chapter illustrates the values of the variable "Bid". This chapter presents the values of all other independent variables and their correlation with each other.

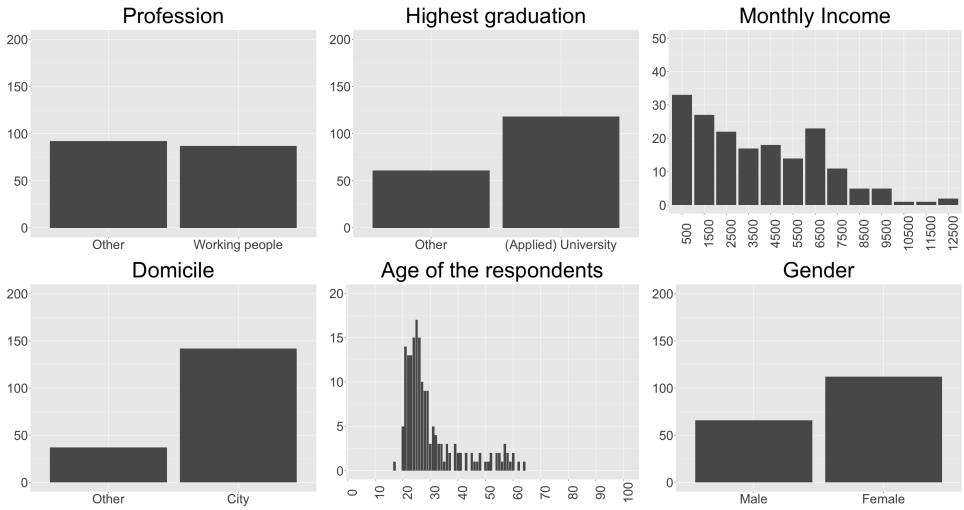

Figure 4.2: The demographic variables

48.5 % of the respondents were "Working people". The majority of all others, in total, 47 %, were at least partly studying. Because of this high share of students, a lot of the respondents had a university degree, did not have a high income, lived in the city, and were young. Lastly, distinctly more women than men completed the questionnaire.

Figure 4.3: The delivery-related variables

The majority of respondents ordered food delivery meals more than once a year, but not more than once a month. Only 10 % ordered more frequently. Meanwhile, 68 % usually ordered for two people and almost half of the respondents used the service of "Just eat".

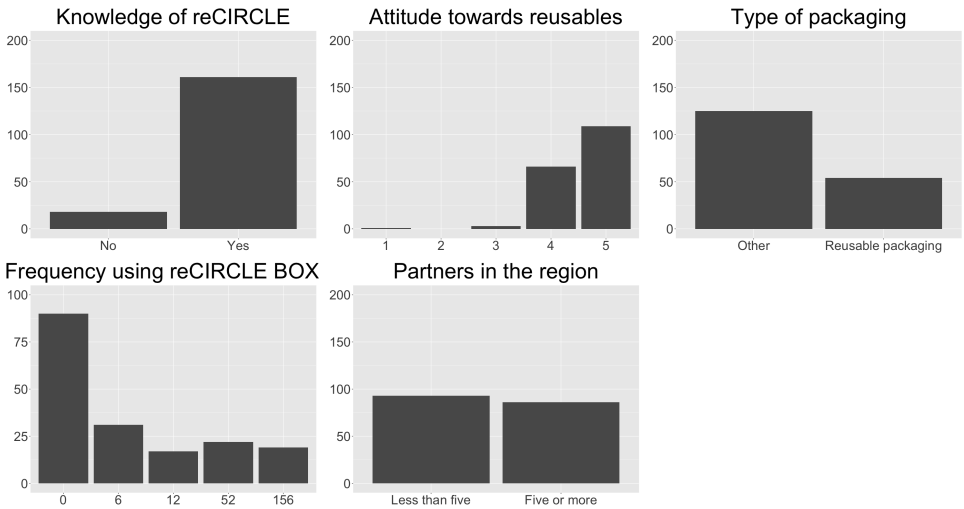

Figure 4.4: The variables related to reusable packaging

Almost every respondent knew the reusable packaging of reCIRCLE and perceived reusable packaging as environmentally-friendly. Yet, only 23 % used reCIRCLE BOXes weekly or more, and 30 % used reusable packaging (Including reCIRCLE BOXes) for takeaway food. Lastly, half of the respondents had at least five reCIRCLE partners close to their homes.

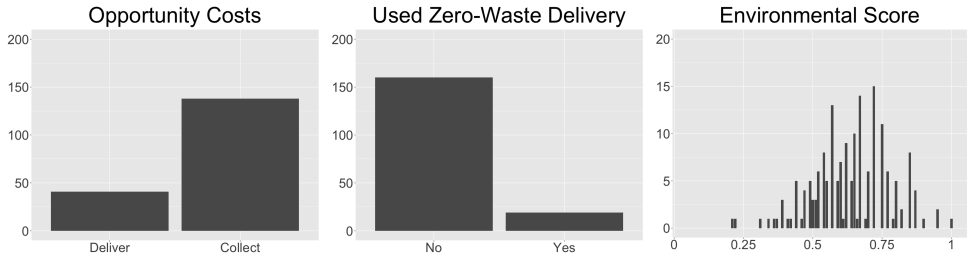

Figure 4.5: The remaining independent variables

The majority of respondents would collect a parcel at Migros rather than pay to have the parcel sent home. Only 11 % of the respondents ever ordered food delivery meals in reusable packaging. Lastly, the values of the "Environmental score" are depicted.

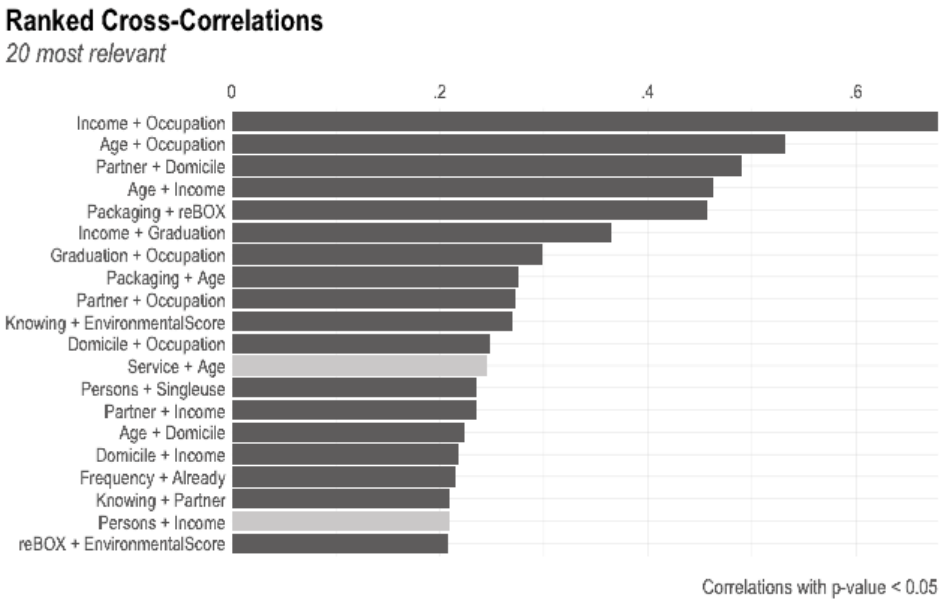

Figure 4.6: The highest linear correlation coefficients between the variables

Figure 4.6 depicts the linear correlation coefficients. Dark-grey bars indicate a positive correlation. According to Hinkle et al. (2003), a correlation coefficient below 0.3 implies a negligible correlation. From 0.3 - 0.5, the correlation is low. From 0.5 - 0.7, the correlation is moderate. Two variable sets had such a moderate correlation. Working people tended to be older, and they also tended to have a higher income. Four variable sets had low correlations. reCIRCLE partners tended to be located in cities. Older respondents tended to earn more. People using reusable packaging for takeaway food tended to use reCIRCLE BOXes and people with a university degree tended to earn more than people without.

4.4 The random utility model

The following chapter presents the results of the mean and median WTP and how the independent variables affect the choice of using the Swiss Post's service.[3] Three assumptions were vital for the linear random utility model. Firstly, how we treated the "Don't Know" from the WTP question. Secondly, the assumption over the distribution of the error term. Lastly, the assumption over the marginal utility of income (See Chapter 2.3). We performed several models varying those assumptions.

	Mean	Median
"Don't Know" as "Yes"	CHF 0.59	CHF 0
"Don't Know" as "No"	CHF 0.3	CHF 0

Table 4.3: The raw mean and median of the WTP

Table 4.3 depicts the raw mean and median of the data set. Because more than half of the respondents would not use the Swiss Post's service, the median was zero in both cases. The average respondent was willing to pay CHF 0.59 when we treated "Don't Know" as "Yes". When we treated "Don't Know" as "No", the mean WTP was lower.

4.4.1 The basic linear models with all variables

The first models are the basic linear random utility models. We performed the models assuming a constant marginal utility of income. We used all the variables. Table 4.4 presents the results of the logit model when "Don't Know" was treated as "Yes".

Six variables were statistically significant on a 95 %-confidence level. People using the food delivery service "Just-eat" were more likely to use the Swiss Post's service (Service). The more often a person ordered food delivery meals, the more likely the person would use the service (Frequency). People using reusable packaging for takeaway were less likely to use the service (Packaging). People collecting a parcel at Migros were less likely to use the service (OpportunityCosts). People with a higher environmental score were also less likely to use the service (EnvironmentalScore). Lastly, the higher the payment for the Swiss Post, the lower the probability that a person used the service (Bid).

3 The dependent variable in the linear random utility model

	Estimate	Std. Error	z value	Pr(>|z|)	
Intercept	2.3113	2.3034	1.00	0.3157	
Knowing	-0.6487	0.7814	-0.83	0.4064	
Service	1.4224	0.4622	3.08	0.0021	**
Persons	0.1218	0.2571	0.47	0.6357	
Frequency	0.0269	0.0133	2.02	0.0437	*
Singleuse	0.1995	0.3749	0.53	0.5947	
Packaging	-1.5844	0.6234	-2.54	0.0110	*
reBOX	0.0060	0.0055	1.09	0.2759	
OpportunityCosts	-1.6024	0.5142	-3.12	0.0018	**
Already	-1.0482	0.8849	-1.18	0.2362	
Age	-0.0154	0.0294	-0.52	0.6012	
Partner	-0.9313	0.5416	-1.72	0.0855	.
Domicile	1.0146	0.6043	1.68	0.0932	.
Gender	0.1822	0.4505	0.40	0.6859	
Income	0.0001	0.0001	0.56	0.5759	
Graduation	0.6535	0.5068	1.29	0.1972	
Occupation	0.3253	0.6892	0.47	0.6369	
EnvironmentalScore	-4.3737	1.9311	-2.26	0.0235	*
Bid	0.4419	0.1152	3.83	0.0001	***

Signific. codes: 0 '***' 0.001 '**' 0.01 '*' 0.05 '.' 0.1 ' ' 1

Table 4.4: The basic logit linear model with all variables and "Don't Know" as "Yes"

Appendix A.3, table A.7 displays the regression table for the basic probit model. The results differ slightly compared to the logit model. Yet, the same variables were significant. For the models, where we treated "Don't Know" as "No", only four variables were significant on a 95 %-confidence level (See Appendix A.3, table A.8 and A.9).

	Logit	Probit
"Don't Know" as "Yes"	CHF 0.54	CHF 0.51
"Don't Know" as "No"	CHF 0.07	CHF 0.03

Table 4.5: The estimated mean and median WTP for the basic linear models

Using equation 2.3 (See chapter 2.3) it is then possible to calculate the WTP. The estimates of the independent variables are used for α. β is the estimate for the variable "Bid" (See table 4.4). Lastly, for z_j, we used the means of the independent variables in the sample.

In the basic linear model, the mean and median WTP are equal. Table 4.5 presents the results for the four models. In the logit model, where we treated "Don't Know" as "Yes", the WTP was the highest, with CHF 0.52. In the probit model, the WTP was slightly lower. When we treated "Don't Know" as "No", the WTP was close to zero.

4.4.2 The reduced linear models

Table 4.6 presents the reduced basic logit model. We excluded eight variables, which did not add significantly more information based on the AIC criterion.

	Estimate	Std. Error	z value	Pr(>|z|)	
(Intercept)	3.0283	1.3027	2.32	0.0201	*
Service	1.3315	0.4195	3.17	0.0015	**
Frequency	0.0249	0.0130	1.92	0.0547	.
Packaging	-1.2972	0.5064	-2.56	0.0104	*
Already	-1.3262	0.8675	-1.53	0.1263	
OpportunityCosts	-1.5753	0.4865	-3.24	0.0012	**
Partner	-0.8164	0.4738	-1.72	0.0849	.
Graduation	0.8032	0.4581	1.75	0.0796	.
Domicile	0.9923	0.5884	1.69	0.0917	.
EnvironmentalScore	-4.5692	1.7800	-2.57	0.0103	*
Bid	0.4212	0.1088	3.87	0.0001	***

Signific. codes: 0 '***' 0.001 '**' 0.01 '*' 0.05 '.' 0.1 ' ' 1

Table 4.6: The reduced basic logit model and "Don't Know" as "Yes"

Five variables were significant on a 95 %-confidence level. Compared to the basic logit model (Table 4.4), the variable "Frequency" was not significant. Still, this and several other variables added sufficient information to the model which we could not omit. The "Likelihood ratio test" did not find a statistically significant difference between this model and the model with all variables. Thus, we preferred the reduced model. Fewer variables were used and there was no significant loss of information.

Appendix A.3, table A.10 presents the probit model with the lowest AIC. In this model, the variable "Income" added sufficient information to the data set, but it was not significant. Appendix A.3, tables A.11 and A.12 present the regression models treating "Don't Know" as "No". The optimal models consisted of only five independent variables each.

	Logit	Probit
"Don't Know" as "Yes"	CHF 0.41	CHF 0.47
"Don't Know" as "No"	CHF 0.18	CHF 0.11

Table 4.7: The estimated mean and median WTP for the reduced basic models

Table 4.7 presents the estimated WTP for those models. The WTP was slightly lower when "Don't Know" was a "Yes" than in the previous models (Figure 4.5). The contrary applied when "Don't Know" was a "No". The estimated WTP was around triple the size.

4.4.3 The log-linear random utility model

The log-linearity model assumes a decreasing marginal utility. Appendix A.3, table A.13 presents the regression table. The AIC criterion value was distinctly higher for this model. The "Likelihood ratio test" rejected the hypothesis that this model accurately represented the linear random utility model on a 95 %-confidence level. Given this result, we preferred the reduced basic model. The median for this model was CHF 0.37 and the mean was CHF 0.65.

4.4.4 The box-cox transformed random utility model

With a box-cox transformation, the marginal utility decreases as well. This decrease is much more intense for low incomes. For very high incomes, the marginal utility becomes almost constant. Appendix A.3, table A.14 presents the regression results of this model. The AIC exceeded the one of the reduced basic model. The "Likelihood ratio test" rejected the hypothesis that the reduced basic model and this model were equal fits. With the box-cox transformation, we could only calculate the median WTP which was CHF 0.33.

4.4.5 The varying parameter specification

For the varying parameter specification, we separated respondents earning more than the mean income from respondents earning less than the mean. Appendix A, table A.15 presents the regression results. An average person earning more than CHF 3902 a month, was willing to pay CHF 0.58 for the Swiss Post's service. This was CHF 0.21 more than an average person earning less than the mean. The AIC criterion value was slightly higher than for the reduced basic model. We preferred the reduced basic model over this model.

4.4.6 Model diagnostics

García-Portugués (2022) set up four assumptions generalised linear models[4] have to satisfy to draw conclusions that are not flawed. We compared our results with plots they provided how reliable results should look. Since the reduced basic logit model fared the best in terms of the AIC criterion, we only analysed the model quality for this model.

4 R treats the linear random utility model as a generalised linear model.

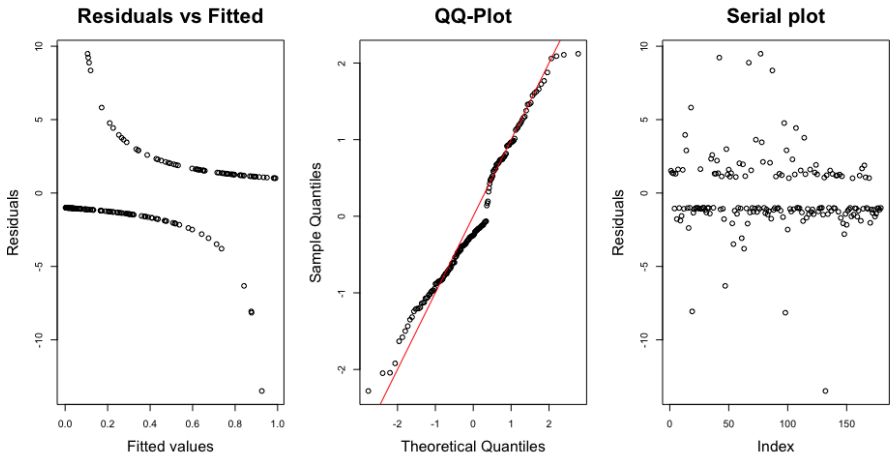

Figure 4.7: Model diagnostics of the reduced basic logit model and "Don't Know as Yes"

Linearity between the independent variable and the dependent variables is the building block of such models (García-Portugués 2022). The "Residuals vs. Fitted" plot shows that this model respects the linearity assumption (Figure 4.7). The QQ-Plot indicates that the standardised residuals follow a $\mathcal{N}(0, 1)$ distribution. The results for the independent variables have to be independent of each other for every respondent. The serial plot of the residuals respected this independence. Lastly, we could not find multicollinearity using the variance inflation factor. No pairs of variables were highly linearly related.

Chapter 5

Discussion

5.1 The optimal random utility model

We analysed different models with different assumptions regarding the distribution of the error term, the treatment of "Don't Know" and the marginal utility of income. A constant marginal utility was the best fit for the model. Haab and McConnell (2002) support this result. They state that for CV studies with a low bid, the marginal utility of income usually does not vary with the respondents' income.

17 respondents did not favour one of the return options. Looking at their reasoning, it was hard to detect a tendency whether they would use the service in reality. Either they said that both options were equally good or that they decided spontaneously. Thus, we preferred the scenario, where we treated "Don't Know" as "Yes". Sometimes, those respondents might use the service. However, this scenario served as an upper bound for the estimated WTP.

Razzaghi (2013) states that the logit and the probit approach usually produce similar results. Table 4.7 and the regression tables (Table 4.6 and table A.10 in Appendix A.3) showed similar patterns. We preferred the logit model because of its advantages in performing the model diagnostics.

The model diagnostics (Chapter 4.4.6) showed that the reduced basic logit model is a good predictor for the WTP for the Swiss Post's service. All assumptions a generalised linear model has to satisfy held. Thus, the results are not flawed and can predict the WTP for the Swiss Post's service.

5.2 The WTP for the Swiss Post's service

The average respondent would pay CHF 0.41 for the Swiss Post's service. This result exceeded the estimated WTP in the study of Schuermann and Woo (2022). Those authors did not use a "No answer" option. More importantly, we think it is unclear whether the WTP question is truly incentive-compatible. They stated that their scenarios resembled real-life scenarios and consequently they were incentive compatible. However, according to Carson and Groves (2007), this only holds for public goods. For private and club goods, researchers should only interview potential users, and give respondents the choice between two alternative configurations of the desired good. However, for the WTP of the return service, this might be less of a problem. Schuermann and Woo (2022) presented two different WTP questions with the return service from the respondents' homes being the only difference. Therefore, incentive compatibility might not have influenced the valuation of this return service if the hypothetical bias was equal for both scenarios. The WTP of Schuermann and Woo (2022) ranged between the lower and upper bounds of the reduced basic logit model. Both studies show that people are willing to pay money not to have to return the packaging themselves.

In e-commerce, people pay money for home delivery rather than to pick up the parcels at the store or a pickup location. Milioti et al. (2020) calculated that respondents in the UK would pay CHF 2.25 more for home delivery rather than walking 500m to a pickup point. Unsurprisingly, the WTP was higher in this scenario than for the Swiss Post's service. The reCIRCLE BOXes usually weigh less than a bag full of food worth CHF 65. Even if the opportunity costs of time do not decrease, it is easier to return the packaging than collecting the bag full of food. That is why we expect the WTP to be lower for the Swiss Post's service.

The results of this thesis are in line with the results of e-commerce studies. People are willing to pay money for more convenience. This service facilitates using reusable packaging for food delivery meals and yields a benefit for some customers. The value and the weight of reusable packaging are low, and many people occasionally pass by a reCIRCLE partner restaurant. Consequently, the opportunity costs of time were low for most of the respondents. Therefore, also the WTP for the Swiss Post's service is low.

5.3 The influencing factors

In the reduced logit model (Table 4.6) the variable "Bid" was positively significant. We coded the payment for the Swiss Post negatively. Thus, the higher the absolute value of the service, the less likely respondents were to use the service. This result follows the "law of demand". People using "Just eat Takeaway.com" were more likely to use the service. Explaining this behaviour is difficult without a deeper knowledge of the food delivery market. Also, this variable did not have high correlations with other variables that could explain the result. Users of reusable packaging for takeaway food were less likely to use the service. A lot of them are using reCIRCLE BOXes. They are familiar with using and returning them and are less dependent on a return service. The variable "Opportunity Costs" was unsurprisingly negatively significant. People that avoid paying money and collect a parcel at Migros were less likely to use the service. Both scenarios analyse the opportunity costs of time of the respondents.[1] Lastly, more environmental-aware people were less likely to use the Swiss Post's service. People might see the Swiss Post's vehicles to collect the packaging as less environmentally-friendly than returning the packaging by foot or bicycle. Thus, they preferred to return the packaging by themselves. Since four respondents raised environmental concerns as a reason against using the service, we expect this argument to be a reason for the significance of the variable.

The number of partners was insignificant at a 95 %-confidence level for the basic logit linear model (Table 4.4). In two models, this variable was significant (Appendix A.3, table A.13 and A.14). This variable measured the opportunity costs of time as well as the variable "Opportunity costs". If the number of return stations increases, the effort to return the packaging decreases. In this thesis, only 14.5 % of the respondents using the service answered that they live too far away from a reCIRCLE partner restaurant. Some people lived in regions with few partners, but they might still have passed by partners regularly. For example, students can return the packaging at the university if the cafeteria is a reCIRCLE partner[2]. We expect the number of partners with the same postal code not being a perfect measure for the opportunity costs of time. Therefore, those mixed results occurred. Regarding the variable "Persons", we expected the variable to be insignificant. People ordering several meals have more packagings to return. However, since

1 Since the variable "Income" is also included in the data set, this variable "Income" captures the opportunity costs of money. Thus, we expect that this variable captures the opportunity costs of time.

2 This is for example the case in Bern, where most university cafeterias are part of the system.

the packaging weighs only some hundred grams, we expect the WTP not to change as the opportunity costs to return the packaging themselves do not change for the respondents.

The majority of the demographic characteristics (Age, domicile, gender, occupation, graduation) were insignificant. Deciding to use the service is a question of convenience. This does not seem to be related to demographic characteristics. The insignificance of "Income" is not too surprising. The share of the payment to the income is low for most respondents and thus might not have influenced the decision. The variables "Knowing", "Already" and "Singleuse" were insignificant because the WTP question analysed the demand for convenience and not for reusable packaging itself. The variable "reBOX" could have been insignificant because of the correlation with packaging. Both variables explain similar patterns. Thus, "reBOX" loses its explanatory power. Lastly, the variable "Frequency" was not significant for the reduced linear model. Yet, it was for the basic model with all variables. At some point, frequent users of food delivery users might become fed up with always having to return the packaging. However, given the mixed results, this behaviour is only weakly pronounced.

5.4 Environmental impact of the Swiss Post's service

reCIRCLE BOXes are more environmentally-friendly when used at least 15 times compared to the average disposable packaging in terms of CO_2eq emissions (Bouchet and Boucher 2021b). The respondents perceived reusable packaging in the same way. Only four respondents did not answer that reusable packaging is more environmentally-friendly. Of course, we have to treat those results carefully. The questionnaire focused on reusable packaging. Primarily, people interested in this topic might have completed the questionnaire. However, for this sample, this statement holds.

Returning the packaging is the main hurdle hindering people from using reusable packaging for food delivery meals. In the questionnaire, 23 of 28 respondents who were unsure or not willing to order meals in reusable packaging mentioned this hurdle. This was by far the most mentioned hurdle followed by the additional effort when ordering the food. Because the service facilitates the return process strongly, it has the potential to accelerate the usage of reusable packaging. We expect that some people would not order without such a service.

In the questionnaire, we did not talk about the environmental impact of the Swiss Post's service to ensure a conservative design. Since some respondents raised concerns over this service from an environmental perspective, it is important to take their concerns seriously and to talk about the impact of the service. Otherwise, these people might not be using reusable packaging. They might think, that using reusable packaging with the service is less environmentally-friendly than using single-use packaging.

In the questionnaire, we told respondents that they could lose the undesired return option. We created this scenario to restore incentive compatibility. In reality, both return options can co-exist. The majority of respondents preferred to return the packaging themselves. Thus, this option should be the main return option. The WTP for the Swiss Post was low and a lot of people would not pay anything at all to return the packaging. Still, it is beneficial for reCIRCLE to offer the Swiss Post's service and transfer the costs to the customer. Some people will continue to use single-use packaging because their WTP is lower than the price of the service. However, some people have a higher WTP than the price for the Swiss Post's service. They start ordering their meals in reusable packaging because they can conveniently return the packaging. In this case, the food delivery market mitigates single-use packaging and reduces its CO_2eq impact.

5.5 Reliability of the sample

Variable	**Sample**	**Population**
Gender	Female: 62.5 %	Female: 48 % (Just-eat Takeaway.com 2021b)
Age	18-34 years: 77 %	18-34 years: 44 % (Just-eat Takeaway.com 2021b)
Domicile	City: 79.5 %	City: 46 % (Just-eat Takeaway.com 2021b)
Occupation	(Part-time) students: 47 %	(Part-time) students: 3.1 % (Bundesamt für Statistik 2022a,b)
Vegetarians	21.2 %	4.1 % (Swissveg 2020)
Vegans	3.4 %	0.6 % (Swissveg 2020)
Median Income	CHF 3500	CHF 6665 (Bundesamt für Statistik 2022c)

Table 5.1: The distribution of certain variables in the sample and either for customers of Just-eat Takeaway.com or in the Swiss Population

To ensure reliable and unbiased results, the sample needs to resemble the target population in its demographic aspects. However, we did not have any information about the target population. Table 5.1 presents the distributions of certain demographic variables in the sample and either for the Swiss Population or for customers of "Just eat Takeaway.com". Both populations do not have to be similar to our target population.

In this thesis, we have data about people using reusable packaging for takeaway food (The variable "Packaging"). We expect that people preferring reusable packaging for takeaway meals should also do so for food delivery meals. The correlations between "Packaging" and "Environmental Score", "Gender", "Occupation", "Age" and "Domicile" were all positive. "Income" had a correlation of almost zero with "Packaging". Therefore, we also expect a higher share of females, older people, full-time workers, people living in cities, vegans and vegetarians and in the target population compared to the population of people ordering food delivery meals or the Swiss population. Meanwhile, median income should be similar.

In many demographic aspects, we expect the sample to adequately represent the unknown population. However, with three exceptions. The share of younger people and the share of students were too high and the median income was too low. For those variables, we expect lower shares in our target population.

5.6 Limitations of the study

The results have to be regarded cautiously. The main reason limiting the study's reliability is the sample itself. Given the high share of students and young people in the sample, we expect that selection bias is an issue affecting the results. Non-coverage bias is also a problem. Since we distributed the questionnaire in German, people not speaking the language did not have a chance to complete the questionnaire. If non-German-speaking people had a different WTP, we would have a non-coverage bias in our data set. However, we can not prove or disprove this bias. The third bias discussed in chapter 3.2, non-response bias, could also be an issue. Since we used the snowball sampling technique, it is impossible to analyse non-response. Yet again, we can not be sure whether this has affected the results. However, we were aware of those potential biases before the study. The advantages of non-probability sampling and distributing the questionnaire only in German outclassed the negative aspects of those methods.

The sample size could be a small issue of the thesis. Carson (2000) states that a sample should consist of several hundred to a couple of thousand respondents to achieve reliable results. A larger sample would increase reliability. However, the sample of this thesis ranges around the lower bound and the results should just be reliable enough.

Another issue of the questionnaire is the number of concerns raised about the ecological disadvantages of the Swiss Post. In reality, the service's CO_2eq impact only exceeds slightly the impact of returning the packaging by foot or bicycle. Respondents had to themselves add environmental concerns as an answer. Therefore, we expect that this was a reason against the service for more than four respondents. We should have explained the environmental impacts of the service. In this case, more respondents could have used the Swiss Post's service.

Even though those issues might have influenced the WTP and the possibility to generalise the results to the whole population, the results are a good first approximation. When using reusable packaging for food delivery meals becomes more convenient and data about the target population exists, a larger study with probability sampling could be conducted. This could ensure even more reliable results.

Chapter 6

Conclusions

With 5 % of global greenhouse gas emissions, MSW is a large contributor to climate change. A large share of MSW occurs from packaging waste. The food-delivery sector uses single-use packaging only to transfer the meals from the restaurant to the customers. The packaging is used only for minutes and then ends up in the garbage bin. Even though the food delivery sector produces only a small share of MSW, all sectors producing MSW should reduce their impact. Reusable packaging can be one solution to reduce waste and emissions in the food delivery sector.

The Swiss company reCIRCLE created a circular system with reusable packaging for the food delivery sector. Customers receive reusable packaging for free, but they have to return the packaging within seven days. Otherwise, they get charged a deposit of CHF 10 and CHF 1 for transaction fees. Using reusable packaging is a change of behaviour for food delivery meal consumers. To make the transition for consumers as easy as possible, the effort to return the packaging needs to be as low as possible. The Swiss Post's service is such a solution which facilitates using reusable packaging for food delivery meals. Therefore, this service yields the potential that customers switch to using reusable packaging.

People are willing to pay money for more convenience. The WTP for the Swiss Post's service is positive. On average, the respondents in the CV questionnaire were willing to pay CHF 0.41 for the service. However, many respondents preferred to return the packaging by themselves. Either they were living close to a reCIRCLE partner restaurant and could easily return the packaging, or they did not want to pay any money at all for the service. Still, such a service is vital. It satisfies the needs of some customers for a convenient

return option. Respondents perceived the additional effort to return the packaging as the main hurdle hindering them from ordering their meals in reusable packaging. Therefore, reCIRCLE needs to give consumers an alternative to returning the packaging themselves. Otherwise, those consumers will not use reusable packaging for food delivery meals.

The Swiss Post collects the packaging while distributing letters and parcels. The additional traffic occurring is negligible. We assumed that using reusable packaging and returning it with e-scooters was more environmentally-friendly than using single-use packaging. The service helps in reducing the use of single-use packaging and does not generate a lot of additional emissions. Therefore, this service can effectively reduce the amount of waste and CO_2eq emissions generated by food delivery services and their customers.

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Appendix A

Appendix

A.1 The questionnaire

1. Introduction to the questionnaire:

Guten Tag

Vielen Dank für das Interesse an dieser Umfrage.

Im Rahmen meiner Masterarbeit am "Oeschger Centre for Climate Change Research" an der Universität Bern, führe ich eine Studie zum Thema "Mehrwegverpackungen im Food Delivery Sektor" durch. In diesem Fragebogen geht es darum herauszufinden, wie hoch die Zahlungsbereitschaft für die Rücknahme der Mehrwegverpackung durch die Schweizerische Post ist.

Im ersten Teil der Umfrage werden Ihnen Fragen zu Ihren Einstellungen gegenüber Mehrwegverpackungen, Lieferdiensten und Ihrem Umweltverhalten gestellt. Im Mittelteil geht es um die Zahlungsbereitschaft für den Service der Schweizerischen Post. Zum Schluss werden Ihnen demografische Fragen wie Alter, Wohnort und Einkommen gestellt.

Das Ausfüllen der Umfrage sollte maximal 5 Minuten beanspruchen. Am Ende der Umfrage können Sie mit der Angabe Ihrer E-Mail-Adresse an einem Gewinnspiel teilnehmen und mit etwas Glüuck einen Gutschein füur einen Lieferdienst Ihrer Wahl gewinnen.

Vielen Dank für Ihre Mithilfe!

If nothing is indicated, the respondents had to answer the question. For some questions, they could add own answers. Some questions were asked in a format including a modulator.

2. Opening questions

In rund 1800 Restaurantbetrieben in der Schweiz können die auberginefarbenen Mehrwegverpackungen (reCIRCLE BOXen) für die Konsumation von Essen und Getränken zum Mitnehmen gekauft werden. Gäste zahlen für die Box 10.- Depot, welches sie bei der Rückgabe der Box wieder zurückerhalten. Mit der neuen reCIRCLE App können die reCIRCLE BOXen auch depotfrei für Essen von Lieferdiensten benutzt werden. Das Vorgehen wird Ihnen später noch detailliert erklärt.

- 1. Haben Sie schon einmal Essen bei einem Lieferdienst bestellt?
  - ☐ Ja
  - ☐ Nein, noch nie
- 2. Kennen Sie die Mehrwegverpackungen von reCIRCLE?
  (Nur eine Antwort möglich)
  - ☐ Nein
  - ☐ Ja, ich kenne sie, habe sie aber noch nie benutzt
  - ☐ Ja, ich kenne sie und habe sie früher ab und zu auch schon benutzt
  - ☐ Ja, ich kenne sie und benutze sie regelmässig
  - ☐ Ja, ich kenne sie und habe mehrere der Boxen zu Hause im Gebrauch

3. Food delivery

Depending on the answer of question 1, either the questions 3 - 5 showed up (If the respondents have ordered food delivery meals at least once), or question 6 showed up (If the respondents have never ordered delivery meals).

- 3. Bei welchem Lieferdienst bestellen Sie meistens Ihr Essen?
  Wählen Sie den Lieferdienst, bei dem Sie am meisten Ihr Essen bestellen
  (Nur eine Antwort möglich)
  - ☐ Uber eats
  - ☐ Just eat Takeaway.com (eat.ch)
  - ☐ Foodnow
  - ☐ Mosis.ch
  - ☐ Smood
  - ☐ Ich bestelle direkt beim Restaurant
  - ☐ Ich nutze einen lokalen Lieferdienst (zB. Schneller Teller, Velogourmet)
  - ☐ Andere:

- 4. Für wie viele Personen bestellen Sie meistens Essen?

  Wählen Sie die Antwort, welche für Sie am besten zutrifft.

  (Nur eine Antwort möglich)

  ☐ 1 Person

  ☐ 2 Personen

  ☐ 3 Personen

  ☐ 4 Personen

  ☐ Mehr als vier Personen

- 5. Wie oft bestellen Sie Essen bei einem Lieferdienst?

  Wählen Sie die Antwort, welche Ihrem Bestellverhalten am besten entspricht.

  (Nur eine Antwort möglich)

  ☐ Täglich

  ☐ Mehrmals pro Woche

  ☐ Einmal pro Woche

  ☐ Einmal pro Monat

  ☐ Weniger als einmal pro Monat

  ☐ Etwa einmal im Jahr

- 6. Wieso bestellen Sie nie Essen bei einem Lieferdienst?

  (Mehrere Antworten möglich)

  ☐ Es ist mir zu teuer

  ☐ Ich bevorzuge es, selber zu kochen

  ☐ Der Abfall, welcher durch die Verpackungen entsteht, stört mich

  ☐ Ich habe schlechte Erfahrungen mit Essen von Lieferdiensten gemacht

  ☐ Ich habe andere Gründe:

4. Reusable packaging

- 7. Stimmen Sie der Aussage zu, dass Mehrwegverpackungen ökologischer sind als Einwegverpackungen?

  Verschieben Sie den Regler beliebig zwischen "Überhaupt nicht" und "Völlig".

  ☐ Überhaupt nicht

  ☐ Eher nicht

  ☐ Es ist beides etwa gleich ökologisch

  ☐ Eher ja

  ☐ Völlig

- 8. Welche Verpackung nutzen Sie meistens, wenn Sie Essen zum Mitnehmen in Restaurants kaufen?

  Wählen Sie die Verpackung, welche Sie am meisten nutzen.

  (Nur eine Antwort möglich)

  ☐ reCIRCLE BOXen

  ☐ Eigene Mehrwegverpackung/Frischhaltedose

  ☐ Ich kaufe meistens Essen, dass nicht in Mehrwegverpackungen verpackt werden kann (zB. Salate, Pizza oder Sandwich)

  ☐ Einwegverpackung

  ☐ Ich kaufe nie Takeaway-Essen

- 9. Wie oft nutzen Sie reCIRCLE BOXen?

  Wählen Sie die Antwort, welche für Sie am besten zutrifft.

  (Nur eine Antwort möglich)

  ☐ Täglich

  ☐ Mehrmals pro Woche

  ☐ Einmal pro Woche

  ☐ Einmal pro Monat

  ☐ Weniger als einmal pro Monat

  ☐ Nie

5. Ecological behaviour

- 10. Essen Sie zu den Hauptmahlzeiten (Frühstück, Mittagessen und Abendessen) Fleisch und/oder Fisch?

  Verschieben Sie den Regler beliebig zwischen "Nie" und "Immer".

  ☐ Nie

  ☐ Selten

  ☐ Gelegentlich

  ☐ Meistens

  ☐ Immer

- 11. Essen Sie zu den Hauptmahlzeiten (Frühstück, Mittagessen und Abendessen) tierische Nebenprodukte, wie zB. Käse, Milch oder Eier?

  Verschieben Sie den Regler beliebig zwischen "Nie" und "Immer".

  ☐ Nie

  ☐ Selten

  ☐ Gelegentlich

  ☐ Meistens

  ☐ Immer

- 12. Achten Sie beim Einkauf darauf, dass die Lebensmittel aus biologischem Anbau sind?

  Verschieben Sie den Regler beliebig zwischen "Nie" und "Immer".

  ☐ Nie

  ☐ Selten

  ☐ Gelegentlich

  ☐ Meistens

  ☐ Immer

- 13. Achten Sie beim Einkauf darauf, dass die Lebensmittel aus lokaler Herkunft sind?

  Verschieben Sie den Regler beliebig zwischen "Nie" und "Immer".

  ☐ Nie

  ☐ Selten

  ☐ Gelegentlich

  ☐ Meistens

  ☐ Immer

- 14. Welche Abfallarten trennen Sie vom restlichen Haushaltsabfall?

  (Mehrere Antworten möglich)

  ☐ Glas

  ☐ Aluminium

  ☐ Papier + Karton

  ☐ PET-Flaschen

  ☐ Anderer Plastik

  ☐ Grüngut

  ☐ Elektronische Geräte

  ☐ Andere:

- 15. Stellen Sie sich vor, Sie bestellen ein Produkt bei der Migros online. Dieses wird entweder kostenfrei in die nächste Migrosfiliale geliefert und Sie können das Produkt dort abholen, oder es wird Ihnen kostenpflichtig nach Hause geliefert, was bevorzugen Sie?

  (Nur eine Antwort möglich)

  ☐ Abholung in der Migros

  ☐ Lieferung nach Hause

  ☐ Ich bin mir nicht sicher

6. "Zero-Waste Delivery"

Über die reCIRCLE App funktioniert der Bestellprozess für Essen in der Mehrwegverpackung wie folgt:

- In der reCIRCLE App wählen Sie ein Restaurant aus, welches das Essen in Mehrwegverpackungen anbietet.
- Sie geben an, wie viele reCIRCLE BOXen Sie benötigen und erhalten einen Code.
- Ihnen wird automatisch die Anzahl reCIRCLE BOXen in Ihrer reCIRCLE App hinzugefügt. Diese müssen Sie innerhalb von 7 Tagen zurückgeben, sonst werden Ihnen die CHF 10 Pfand und CHF 1 Transaktionsgebühren pro Produkt verrechnet.
- Sie werden automatisch auf die Bestellseite des Lieferdienstes weitergeleitet und können dort Ihre Bestellung abgeben.
- Im Feld "Anmerkungen" geben Sie den Code ein.
- Sie wählen bei der Bestellung aus, ob Sie die reCIRCLE BOX selbst zurückbringen wollen oder geben an, dass die Schweizerische Post die reCIRCLE BOX(en) abholen soll.
- Das Essen wird Ihnen in der reCIRCLE BOX geliefert.

- 16. Haben Sie bei einem Lieferdienst schon einmal Essen in einer Mehrwegverpackung bestellt?
  - ☐ Ja
  - ☐ Nein
- 17. Können Sie es sich (weiterhin) vorstellen, Ihr Essen in einer Mehrwegverpackung zu bestellen?
  (Nur eine Antwort möglich)
  - ☐ Ja
  - ☐ Nein
  - ☐ Vielleicht

After question 16, the respondents ware asked to justify their answer. Therefore, depending on the answer a different question showed up.

- 18. Wieso können Sie es sich vorstellen, Ihr Essen in einer Mehrwegverpackung zu bestellen?

  (mehrere Antworten möglich)

  ☐ So kann ich Abfall einsparen

  ☐ So kann ich mich umweltfreundlicher verhalten

  ☐ Ich möchte es einfach mal testen

  ☐ Ich finde es praktischer, aus einer Mehrwegverpackung zu essen als aus einer Einwegverpackung

  ☐ Ich finde, das Essen ist in einer Mehrwegverpackung leckerer als in einer Einwegverpackung

  ☐ Ich glaube, dass Mehrwegverpackungen hygienischer sind als Einwegverpackungen

  ☐ Ich habe andere Gründe:

- 19. Wieso sind Sie sich unsicher, Essen in einer Mehrwegverpackung zu bestellen?

  (mehrere Antworten möglich)

  ☐ Ich bin mir nicht sicher, wie gross der Aufwand ist, die Mehrwegverpackung zurückzubringen

  ☐ Ich bin mir nicht sicher, wie gross der Zusatzaufwand bei der Bestellung ist

  ☐ Ich bin mir nicht sicher, ob das Essen in einer Mehrwegverpackung dieselbe Qualität hat

  ☐ Ich bin nicht sicher, ob Mehrwegverpackungen hygienisch sind

  ☐ Ich bin mir nicht sicher, ob Mehrwegverpackungen ökologischer sind als Einwegverpackungen

  ☐ Ich habe andere Gründe:

- 20. Wieso können Sie es sich nicht vorstellen, Ihr Essen in einer Mehrwegverpackung zu bestellen?

  (mehrere Antworten möglich)

  ☐ Ich werde auch weiterhin kein Essen bei Lieferdiensten bestellen

  ☐ Ich habe mit Mehrwegverpackungen schon schlechte Erfahrungen gemacht

  ☐ Der Bestellprozess ist mir zu aufwändig

  ☐ Die Rückgabe ist mir zu aufwändig

  ☐ Ich glaube nicht, dass mein eingesparter Abfall relevant für die Umwelt ist

  ☐ Ich glaube nicht, dass Mehrwegverpackungen ökologischer sind als Einwegverpackungen

  ☐ Ich glaube nicht, dass Mehrwegverpackung hygienisch sind

  ☐ Ich glaube nicht, dass Essen in Mehrwegverpackungen lecker ist

  ☐ Ich habe andere Gründe:

7. The WTP section

In dieser Umfrage geht es darum, herauszufinden, welche Rückgabemöglichkeiten angeboten werden sollen, und wie viel Sie für die Abholung durch die Schweizerische Post bezahlen würden. Ihre Entscheidung beeinflusst also die Wahl, welche der beiden Rückgabe-Optionen in Zukunft möglich ist.

In der nächsten Frage werden Ihnen nun zwei Optionen angezeigt und Sie müssen sich entscheiden, welche der beiden Optionen Sie bevorzugen:

- Die selbstständige Rückgabe bei einem reCIRCLE Partner Restaurant (zB. Tibits, Coop Restaurant, Migros Restaurant und 1800 weitere Restaurants in der Schweiz, hier finden Sie alle reCIRCLE Partner https://www.recircle.ch/where)
- Die Rückgabe über die Schweizerische Post. Diese Option ist kostenpflichtig. In der Antwortoption ist ersichtlich, wie viel Sie für diese Option bezahlen müssen. Es kommt nicht darauf an, wie viele Produkte Sie zurückgeben, die Kosten sind immer gleich hoch.

Die Kosten für den Service der Schweizerischen Post wird Ihnen über die Kreditkarte, welche Sie in der reCIRCLE App angegeben haben, abgezogen. Seien Sie sich also bewusst, dass dieser Service ihr verfügbares Haushaltseinkommen verringert.

Afterwards, the WTP questions showed up. One of eight alike question, except for the value of the service of the Swiss Post, were randomly presented. The different values of the service were: CHF 0.2, CHF 0.5, CHF 1, CHF 2, CHF 3, CHF 4, CHF 5 or CHF 10.

- 21. Für die Rückgabe Ihrer reCIRCLE BOX(en) haben Sie folgende zwei Optionen, welche bevorzugen Sie?
  Hier findest du die Karte mit allen reCIRCLE Partnern: https://www.recircle.ch/where
  (Nur eine Antwort möglich)
  - ☐ Ich bringe meine reCIRCLE BOX selber zu einem reCIRCLE Partner Restaurant zurück
  - ☐ Die Post soll meine reCIRCLE BOX(en) in meinem Briefkasten abholen kommen - Ich zahle dafür 20 Rappen
  - ☐ Ich weiss es nicht

Afterwards, the respondents ware asked to justify their answers of question 20.

- 22. Wieso haben Sie sich für die Rückgabe per Post entschieden?
  (mehrere Antworten möglich)
  - ☐ Es ist bequemer
  - ☐ Ich wohne weit weg von einem reCIRCLE Partner
  - ☐ Ich weiss nicht, wo der nächste reCIRCLE Partner ist
  - ☐ Ich habe andere Gründe:
- 23. Wieso haben Sie sich dafür entschieden, die reCIRCLE BOX selber zurückzubringen?
  (mehrere Antworten möglich)
  - ☐ Ich bin nicht bereit für die Rückgabe so viel zu zahlen
  - ☐ Ich will für die Rückgabe gar nicht zahlen müssen
  - ☐ Ich wohne gerade in der Nähe von einem reCIRCLE Partner oder komme gelegentlich an einem Partner vorbei
  - ☐ Ich habe andere Gründe:
- 24. Wieso konnten Sie sich nicht für eine der beiden Optionen entscheiden?
  (mehrere Antworten möglich)
  - ☐ Beide Optionen waren gleich gut
  - ☐ Die Fragestellung war für mich unklar
  - ☐ Ich habe andere Gründe:

8. Demographic questions

- 25. Wie alt sind Sie?

  (Bitte im Zahlenformat angeben)

- 26. Wie lautet die Postleitzahl Ihres Wohnorts?

  (Bitte im Zahlenformat angeben)

- 27. Mit welchem Geschlecht identifizieren Sie sich?

  ☐ Männlich

  ☐ Weiblich

  ☐ anderes:

- 28. Wie hoch ist Ihr monatliches Bruttoeinkommen?

  ☐ 0-999

  ☐ 1'000-1'999

  ☐ 2'000-2'999

  ☐ 3'000-3'999

  ☐ 4'000-4'999

  ☐ 5'000-5'999

  ☐ 6'000-6'999

  ☐ 7'000-7'999

  ☐ 8'000-8'999

  ☐ 9'000-9'999

  ☐ 10'000-10'999

  ☐ 11'000-11'999

  ☐ 12'000 oder mehr

- 29. Was ist Ihr höchster Schulabschluss?

  ☐ Berufliche Grundbildung (Lehre)

  ☐ Berufs- / Fachmaturität

  ☐ Gymnasiale Maturität

  ☐ Fachhochschule

  ☐ Universität / ETH

  ☐ Doktorat

  ☐ andere:

- 30. Welche Tätigkeit üben Sie aktuell aus?

  Wählen Sie die Option aus, welche Ihrer Tätigkeit am besten entspricht.

  (Nur eine Antwort möglich)

  ☐ Vollzeit-Student*in oder Schüler*in

  ☐ Student*in und maximal bis zu einem 40% Pensum arbeitstätig

  ☐ Student*in und zu mehr als zu einem 40% Pensum arbeitstätig

  ☐ Praktikant*in

  ☐ Arbeitstätig

  ☐ Arbeitslos

  ☐ Hausmann oder Hausfrau

  ☐ Pensioniert

  ☐ Andere:

9. Closure

Ich bedanke mich herzlich für Ihre Mitarbeit. Ihre Informationen sind sehr wertvoll für das Gelingen meiner Masterarbeit.

Es kann sein, dass sich der Ihnen präsentierte Bestellprozess in dieser Umfrage teilweise von der Realität unterscheidet und der tatsächliche Bestellprozess anders ist. Mit ihren Antworten wird eruiert, ob die Rückgabe per Post angeboten werden muss und wie hoch die Zahlungsbereitschaft für diesen Service ist.

Die selbstständige Rückgabe wird auch unabhängig der Resultate dieser Arbeit weiterhin möglich sein.

- 31.Möchten Sie am Gewinnspiel teilnehmen, dann geben Sie Ihre E-Mail-Adresse an. Mit etwas Glück können Sie einen Gutschein von einem Lieferdienst Ihrer Wahl im Wert von CHF 30 gewinnen. Wollen Sie nicht teilnehmen, können Sie das Feld leer lassen.
- 32. Haben Sie noch Anmerkungen oder Fragen zu dieser Umfrage oder zu reCIRCLE im Allgemeinen?

  Möchten Sie eine Antwort erhalten, dann vergessen Sie nicht, Ihre E-Mail-Adresse anzugeben. Falls Sie keine Fragen oder Anmerkungen haben, können Sie dieses Textfeld leer lassen.

Vielen Dank!

A.2 Answers to the questionnaire

Question 18: Wieso können Sie es sich vorstellen, Ihr Essen in einer Mehrwegverpackung zu bestellen?

So kann ich Abfall einsparen	152/163
So kann ich mich umweltfreundlicher verhalten	155/163
Ich möchte es einfach mal testen	30/163
Ich finde es praktischer, aus einer Mehrwegverpackung zu essen als aus einer Einwegverpackung	40/163
Ich finde, das Essen ist in einer Mehrwegverpackung leckerer als in einer Einwegverpackung	30/163
Ich glaube, dass Mehrwegverpackungen hygienischer sind als Einwegverpackungen	4/163
Ich habe andere Gründe:	0/163

Question 19: Wieso sind Sie sich unsicher, Essen in einer Mehrwegverpackung zu bestellen?

Ich bin mir nicht sicher, wie gross der Aufwand ist, die Mehrwegverpackung zurückzubringen	22/25
Ich bin mir nicht sicher, wie gross der Zusatzaufwand bei der Bestellung ist	10/25
Ich bin mir nicht sicher, ob das Essen in einer Mehrwegverpackung dieselbe Qualität hat	2/25
Ich bin nicht sicher, ob Mehrwegverpackungen hygienisch sind	7/25
Ich bin mir nicht sicher, ob Mehrwegverpackungen ökologischer sind als Einwegverpackungen	3/25
Ich habe andere Gründe:	4/25
Habe bis jetzt nur Pizza bestellt	
Kosten	
Wegbringen kostet Zeit, dann lieber Einwegverpackungen oder kostenpflichtige Abholung. Time is money	
Wenn ich Essen bestelle, dann bei eher teuren Restaurants. Die Mahlzeiten werden auf Hauseigenen Tellern geliefert, und auch wieder abgeholt. Somit erübrigt sich die Frage	

Question 20: Wieso können Sie es sich nicht vorstellen, Ihr Essen in einer Mehrwegverpackung zu bestellen?

Ich werde auch weiterhin kein Essen bei Lieferdiensten bestellen	2/3
Ich habe mit Mehrwegverpackungen schon schlechte Erfahrungen gemacht	0/3
Der Bestellprozess ist mir zu aufwändig	1/3
Die Rückgabe ist mir zu aufwändig	1/3
Ich glaube nicht, dass mein eingesparter Abfall relevant für die Umwelt ist	1/3
Ich glaube nicht, dass Mehrwegverpackungen ökologischer sind als Einwegverpackungen	1/3
Ich glaube nicht, dass Mehrwegverpackung hygienisch sind	1/3
Ich glaube nicht, dass Essen in Mehrwegverpackungen lecker ist	0/3
Ich habe andere Gründe:	0/3

Question 22: Wieso haben Sie sich für die Rückgabe per Post entschieden?

Es ist bequemer	45/48
Ich wohne weit weg von einem reCIRCLE Partner	7/48
Ich weiss nicht, wo der nächste reCIRCLE Partner ist	14/48
Ich habe andere Gründe:	4/48
Ausserdem spare ich dadurch Opportunitätskosten, so wäre der ökonomische Gewinn ausgeglichen, wenn ich keine Zeit aufwenden muss, um zum nächsten reCIRCLE Partner zu gehen.	
preis-leistung ist einfacher als überlegen wo abgeben	
sonst muss ich wieder an etwas denken, das ich zu einem bestimmten Zeitpunkt erledigen muss	
wenn ich in der Nähe der Filiale wohnen würde, bei der ich das Essen bestellt habe, würde ich versuchen, die Box wenn möglich selber zurückzubringen.	

Question 23: Wieso haben Sie sich dafür entschieden, die reCIRCLE BOX selber zurückzubringen?

Ich bin nicht bereit für die Rückgabe so viel zu zahlen	44/114
Ich will für die Rückgabe gar nicht zahlen müssen	53/114
Ich wohne gerade in der Nähe von einem reCIRCLE Partner oder komme gelegentlich an einem Partner vorbei	71/114
Ich habe andere Gründe:	10/114
Da ich selber an einem reCIRCLE Partner vorbeikomme (mit ÖV und zu Fuss), ist es nicht nötig, dass die Post den Transport für macht. Das ist ökologischer.	
Der Service publique soll nicht dafür eingesetzt werden	
Direkte Bindung	
Es spart auch Ressourcen wenn ich das selber übernehme	
Ich denke, es ist ökologischer mit dem Velo die Box zurückzubringen. Wenn ich weiss, dass ich es nicht schaffen werde, in den vorgegebenen Tagen die Box zu retournieren, wäre die Post eine super Möglichkeit, welche ich auch für 5.- nutzen würde.	
Ich finde das Hin und Her fahren und das Zurückgeben im Logistiksystem der Post nicht ökologisch sinnvoll.	
Ich finde dies am sinnvollsten.	
Ich hab zeit um das selber zurückzubringen	
Ich habe das Gefühl, dass es nicht mehr so umweltfreundlich ist, wenn die Post dann meine reCIRCLE BOX bei mir abholen muss. Dann ist wohl ein Karton doch wieder umweltfreundlicher?	
Würde nur bei der Arbeit in der Nähe eines reCIRCLE Partner Essen konsumieren.	

Question 24: Wieso konnten Sie sich nicht für eine der beiden Optionen entscheiden?

Beide Optionen waren gleich gut	9/17
Die Fragestellung war für mich unklar	1/17
Ich habe andere Gründe:	9/17
Es kommt darauf an, ob der Lieferdienst von der Nähe ist und ich sowieso dort vorbeigehe....	
Es kommt drauf an, ob ich an einer nahegelgeben Partner vorbeifahre, da es keinen in unmittelbarer Nähe gibt	
Ich habe mir überlegt, ob es keine bessere Lösung gibt. Bspw. Rückgabe bei der nächsten Bestellung, Partnerschafft mit Migros o.ä. und die Boxen werden von recycle abgeholt, etc.	
Ich nutze Wegwerf Verpackungen	
Je nach Situation kann mal die eine, mal die andere Option besser sein.	
Rückgabe im Restaurant ist umständlich, Abholung via Post sollte kostenlos sein	
Selbst zurückbringen ist gut, wenn man unterwegs häufig bei einem Partnerrestaurant vorbeigeht. Es gibt so weniger Aufwand für die Post. Ich bin aber auch bereit, 1.- für die Abholung zu zahlen, wenn die Rückgabe für mich sehr umständlich ist.	
Zu wenige infos für meine wohnumgebung	
zurückbringen und bezahlen sind beides optionen, die meiner bequemlichkeit und meinem finanziellen Dasein ein Kritikpunkt.	

A.3 Regression tables

Table A.7: The basic probit model with all variables and "Don't Know" as "Yes"

	Estimate	Std. Error	z value	Pr(>|z|)	
Intercept	1.3154	1.3317	0.99	0.3233	
Knowing	-0.4236	0.4560	-0.93	0.3530	
Service	0.8244	0.2628	3.14	0.0017	**
Persons	0.0635	0.1448	0.44	0.6609	
Frequency	0.0162	0.0075	2.16	0.0309	*
Singleuse	0.1179	0.2158	0.55	0.5847	
Packaging	-0.9342	0.3522	-2.65	0.0080	**
reBOX	0.0036	0.0031	1.15	0.2513	
OpportunityCosts	-0.9099	0.2923	-3.11	0.0019	**
Already	-0.6309	0.4901	-1.29	0.1980	
Age	-0.0103	0.0168	-0.62	0.5379	
Partner	-0.5534	0.3099	-1.79	0.0742	.
Domicile	0.5852	0.3485	1.68	0.0931	.
Gender	0.0866	0.2617	0.33	0.7408	
Income	0.0000	0.0001	0.61	0.5422	
Graduation	0.3673	0.2922	1.26	0.2088	
Occupation	0.2131	0.3943	0.54	0.5890	
EnvironmentalScore	-2.3850	1.0847	-2.20	0.0279	*
Bid	0.2576	0.0654	3.94	0.0001	***

Signific. codes: 0 '***' 0.001 '**' 0.01 '*' 0.05 '.' 0.1 ' ' 1

Table A.8: The basic logit model with all variables and "Don't Know" as "No"

	Estimate	Std. Error	z value	Pr(>|z|)	
Intercept	1.5545	2.5884	0.60	0.5481	
Knowing	-0.8760	0.8398	-1.04	0.2969	
Service	1.1404	0.4881	2.34	0.0195	*
Persons	0.1916	0.2891	0.66	0.5075	
Frequency	0.0145	0.0172	0.84	0.3989	
Singleuse	0.2144	0.4403	0.49	0.6263	
Packaging	-1.8043	0.7435	-2.43	0.0152	*
reBOX	0.0086	0.0063	1.38	0.1678	
OpportunityCosts	-1.5319	0.5558	-2.76	0.0059	**
Already	-1.0212	1.0064	-1.01	0.3103	
Age	-0.0418	0.0334	-1.25	0.2112	
Partner	-0.6507	0.5703	-1.14	0.2539	
Domicile	1.1080	0.6644	1.67	0.0954	.
Gender	-0.4621	0.4994	-0.93	0.3548	
Income	-0.0000	0.0001	-0.18	0.8557	
Graduation	0.5159	0.5589	0.92	0.3560	
Occupation	0.8010	0.7655	1.05	0.2954	
EnvironmentalScore	-1.2996	2.1281	-0.61	0.5414	
Bid	0.7450	0.1736	4.29	0.0000	***

Signific. codes: 0 '***' 0.001 '**' 0.01 '*' 0.05 '.' 0.1 ' ' 1

Table A.9: The basic probit model with all variables and "Don't Know" as "No"

	Estimate	Std. Error	z value	Pr(>|z|)	
Intercept	1.1426	1.4430	0.79	0.4285	
Knowing	-0.4328	0.4728	-0.92	0.3600	
Service	0.6709	0.2741	2.45	0.0144	*
Persons	0.1078	0.1588	0.68	0.4973	
Frequency	0.0073	0.0098	0.75	0.4554	
Singleuse	0.0999	0.2410	0.41	0.6784	
Packaging	-1.0143	0.4010	-2.53	0.0114	*
reBOX	0.0048	0.0034	1.42	0.1558	
OpportunityCosts	-0.8799	0.3082	-2.85	0.0043	**
Already	-0.6290	0.5511	-1.14	0.2537	
Age	-0.0256	0.0188	-1.36	0.1728	
Partner	-0.3818	0.3221	-1.19	0.2359	
Domicile	0.5790	0.3703	1.56	0.1179	
Gender	-0.2798	0.2805	-1.00	0.3185	
Income	-0.0000	0.0001	-0.22	0.8235	
Graduation	0.3059	0.3154	0.97	0.3321	
Occupation	0.5172	0.4301	1.20	0.2292	
EnvironmentalScore	-0.9911	1.1844	-0.84	0.4027	
Bid	0.4014	0.0919	4.37	0.0000	***

Signific. codes: 0 '***' 0.001 '**' 0.01 '*' 0.05 '.' 0.1 ' ' 1

Table A.10: The reduced basic probit model and "Don't Know" as "Yes"

	Estimate	Std. Error	z value	Pr(>|z|)	
Intercept	1.4495	0.7559	1.92	0.0552	.
Service	0.8637	0.2454	3.52	0.0004	***
Frequency	0.0137	0.0072	1.89	0.0585	.
Packaging	-0.7178	0.2839	-2.53	0.0115	*
Already	-0.7395	0.4839	-1.53	0.1265	
OpportunityCosts	-0.9031	0.2812	-3.21	0.0013	**
Partner	-0.5009	0.2765	-1.81	0.0700	.
Domicile	0.5489	0.3398	1.62	0.1063	
Income	0.0001	0.0000	1.82	0.0684	.
EnvironmentalScore	-2.1586	0.9835	-2.19	0.0282	*
Bid	0.2456	0.0615	3.99	0.0001	***

Signific. codes: 0 '***' 0.001 '**' 0.01 '*' 0.05 '.' 0.1 ' ' 1

Table A.11: The reduced basic logit model and "Don't Know" as "No"

	Estimate	Std. Error	z value	Pr(>|z|)	
Intercept	1.2765	0.5627	2.27	0.0233	*
Service	1.1923	0.4315	2.76	0.0057	**
Packaging	-2.0505	0.6584	-3.11	0.0018	**
OpportunityCosts	-1.6054	0.4946	-3.25	0.0012	**
reBOX	0.0086	0.0055	1.58	0.1152	
Bid	0.7560	0.1681	4.50	0.0000	***

Signific. codes: 0 '***' 0.001 '**' 0.01 '*' 0.05 '.' 0.1 ' ' 1

Table A.12: The reduced basic probit model and "Don't Know" as "No"

	Estimate	Std. Error	z value	Pr(>|z|)	
Intercept	0.6990	0.3198	2.19	0.0288	*
Service	0.6983	0.2456	2.84	0.0045	**
Packaging	-1.1857	0.3592	-3.30	0.0010	**
OpportunityCosts	-0.9218	0.2805	-3.29	0.0010	**
reBOX	0.0049	0.0030	1.62	0.1042	
Bid	0.4100	0.0898	4.57	0.0000	***

Signific. codes: 0 '***' 0.001 '**' 0.01 '*' 0.05 '.' 0.1 ' ' 1

Table A.13: The log-linear logit model with "Don't Know" as "Yes"

	Estimate	Std. Error	z value	Pr(>|z|)	
Intercept	1.8108	1.1479	1.58	0.1147	
Frequency	0.0150	0.0109	1.38	0.1671	
Service	1.5723	0.4065	3.87	0.0001	***
Packaging	-1.1423	0.4860	-2.35	0.0188	*
Already	-1.1967	0.8009	-1.49	0.1351	
OpportunityCosts	-1.6644	0.4803	-3.47	0.0005	***
Partner	-1.0235	0.4543	-2.25	0.0243	*
Graduation	0.5271	0.4495	1.17	0.2409	
Domicile	0.8595	0.5620	1.53	0.1262	
EnvironmentalScore	-2.9536	1.5680	-1.88	0.0596	.
lg.income	2628.2767	1135.8003	2.31	0.0207	*

Signific. codes: 0 '***' 0.001 '**' 0.01 '*' 0.05 '.' 0.1 ' ' 1

Table A.14: The box-cox logit model with "Don't Know" as "Yes"

	Estimate	Std. Error	z value	Pr(>|z|)	
Intercept	2.5662	1.2246	2.10	0.0361	*
Frequency	0.0167	0.0113	1.48	0.1394	
Service	1.5300	0.4170	3.67	0.0002	***
Packaging	-1.1658	0.4988	-2.34	0.0194	*
Already	-1.1217	0.8145	-1.38	0.1685	
OpportunityCosts	-1.6666	0.4915	-3.39	0.0007	***
Partner	-0.9368	0.4652	-2.01	0.0440	*
Graduation	0.5062	0.4596	1.10	0.2707	
Domicile	0.8989	0.5848	1.54	0.1242	
EnvironmentalScore	-3.6085	1.6800	-2.15	0.0317	*
sq.income	15.1306	4.4762	3.38	0.0007	***

Signific. codes: 0 '***' 0.001 '**' 0.01 '*' 0.05 '.' 0.1 ' ' 1

Table A.15: The logit model with a varying parameter specification

	Estimate	Std. Error	z value	Pr(>|z|)	
Intercept	3.0381	1.3002	2.34	0.0195	*
Frequency	0.0211	0.0127	1.66	0.0978	.
Service	1.4449	0.4349	3.32	0.0009	***
Packaging	-1.2816	0.5063	-2.53	0.0114	*
Already	-1.1945	0.8689	-1.37	0.1692	
OpportunityCosts	-1.6382	0.4953	-3.31	0.0009	***
Partner	-0.8878	0.4792	-1.85	0.0640	.
Graduation	0.6990	0.4716	1.48	0.1383	
Domicile	1.0217	0.5975	1.71	0.0873	.
EnvironmentalScore	-4.3815	1.8005	-2.43	0.0150	*
Overm	0.3289	0.1267	2.60	0.0094	***
Underm	0.5143	0.1424	3.61	0.0003	***

Signific. codes: 0 '***' 0.001 '**' 0.01 '*' 0.05 '.' 0.1 ' ' 1

Declaration of consent

on the basis of Article 30 of the RSL Phil.-nat. 18

Name/First Name: Spycher Nils Florin

Registration Number: 15-118-003

Study program: Master in Climate Sciences

Bachelor ☐ Master ☑ Dissertation ☐

Title of the thesis: Estimating food delivery customers' willingness to pay for convenience to accelerate the usage of reusable packaging

Supervisor: Prof. Dr. Eric Strobl

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Bern, 14. December 2022

Place/Date

Signature