



Breaking the Time Preference

A study of home delivery

Gustav Alvinsson

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The authors declare that they are the sole authors of this thesis and that they have not used any sources other than those listed in the bibliography and identified as references. They further declare that they have not submitted this thesis at any other institution to obtain a degree.

Contact Information:

Author(s):

Gustav Alvinsson

E-mail: guaa16@student.bth.se

University advisor:

Henrik Sällberg

Department of Industrial Economics

Faculty of Engineering
Blekinge Institute of Technology
SE-371 79 Karlskrona, Sweden

Internet : www.bth.se
Phone : +46 455 38 50 00
Fax : +46 455 38 50 57

Abstract

Background. E-commerce is ever expanding, and with it, so is last-mile delivery. Last-mile delivery is the last part of any delivery from a retailer or etailer (online retailer) to a consumer. Last-mile delivery is one of the most costly parts of the supply chain for many etailers and as such efforts have been made to understand what drives preferences for last-mile delivery. To broaden this field, this study will introduce time preference theory to the last-mile delivery and examine if delayed payment of an online purchase has any effect on the last-mile deliver preferences.

Objectives. The objectives of this study is to examine if delayed payment of online purchases has any effect on the last-mile delivery preference for consumers, as well as broaden the knowledge on last-mile delivery preferences in general. This is done with the inclusion of time preference theory as an underlying theory.

Methods. The study is carried out through the use of an experiment study with an experiment survey. The survey was made into three different versions, distributed to three different experiment groups. The data was then tested with a non-parametric proportion test with varying values of proportion to see whether there was any significant proportion of the replies that were in favor of delay of payment having any effect on the consumer preference.

Results. The results of the study showed that consumers generally choose the last-mile delivery option with the lowest delivery fee. This is in line with previous findings which concluded that delivery fee and delivery speed are the two most important factors for consumers. The only case in which consumers indicated that there was any effect of the payment delay was in the case of an expensive product. Even then it is hard to rule out that it was not something else that brought this result.

Conclusions. The concluding findings of the study is that while time preference was added as an attribute for last-mile delivery, it had little to no effect. This may have been because of the study design of this study. For future research on the topic, examining time preference in a greater depth may give different findings from this study.

Keywords: Time preference, last-mile delivery, consumer preference

Sammanfattning

Bakgrund. E-handel ökar ständigt, och med det även frakt av ehandelsvaror. Frakten som skrivs om i den här studien syftar till den frakt som sker mellan en återförsäljare och en slutkonsument. Denna är i texten kallad last-mile delivery. Denna är identifierad som mycket kostnadsbärande för återförsäljare och därför har ansträngningar gjorts för att ta reda på vad som driver konsumentpreferenser vid frakt av ehandelsvaror. För att bredda det här fältet och den nuvarande kunskapen inom område har den här studien introducerat tidspreferensteori som underlag och adderat betalningsfördröjning som attribut vid last-mile delivery för att se vilken effekt detta har på preferenser vid fraktval.

Syfte. Syftet med den här studien är att ta reda på hur en fördröjd betalning kan påverka preferenserna för olika last-mile delivery-alternativ. Överlag syftar också studien till att bredda kunskapen inom området. Detta görs alltså med introduktionen av tidspreferensteori till området.

Metod. Studien är en experimentstudie med en ansluten enkät. Enkäten gjordes i tre utföranden och skickades ut i tre distinkta experimentgrupper. Därefter testades datan med ett icke-parametriskt proportionstest för att se om det fanns någon signifikant mängd svar som stödjer att en fördröjd betalning påverkar konsumentens val av last-mile delivery-alternativ.

Resultat. Resultaten av studien visar att det inte finns någon koppling mellan en fördröjd betalning och ändrade konsumentbeteenden i fraktpreferenser. Överlag så valdes fraktsalternativet med lägst frakt. Detta är något som går igen i flera tidigare studier där man kommit fram till att fraktkostnad och leveranshastighet är de två mest betydelsefulla aspekterna av frakten. Det enda scenariot som visade någon förändring i preferens var då produkten vid köpet var en dyr sådan. Huruvida preferensskiftet går att tillskriva den fördröjda betalningen förblir oklart, men inte osannolikt.

Slutsatser. Slutsatsen till studien blir att trots tidspreferens och fördröjd betalning användes i studien så gav de inget mervärde. Resultatet blev i linje med tidigare resultat. Att tidspreferensteorin inte höll för fraktpreferenserna kan haft att göra med studiedesignen. En framtida studie hade kunnat göra ett mer ingående arbete och fokusera ännu mer på tidspreferensen för att hitta nya resultat.

Nyckelord: Tidspreferens, last-mile delivery, frakt, fraktpreferens, konsumentpreferenser

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This chapter serves as a presentation to the subject discussed through the thesis. The relevant background for the thesis is discussed, and the problem is presented. Delimitations made by the authors are presented, and finally a structure outline is presented for the rest of the thesis.

1.1 Background

E-commerce is fast expanding and it is changing the way that people shop all around the world. According to the European E-commerce report in 2021 by [Lone et al., 2021], Sweden had an e-commerce growth rate of 36% in 2020. Furthermore, in 2021, E-GDP which is defined as the share of GDP that is made up of e-commerce amounted to 4.6% in Europe [Lone et al., 2021]. One of the more important factors affecting e-commerce growth is logistics [Sinha and Rabinovich, 2004, Turban et al., 2015], however, the growth of e-commerce poses challenges for retailers (online retailers) as well. Especially the last-mile delivery, which is defined as the final stretch of parcel delivery to a consumer who must collect the parcel either at a collection point or at home, is an important factor to ensure order fulfillment [Boyer et al., 2009, Esper et al., 2003]. Last-mile delivery has been credited as being between 5 and 23 times as expensive as a product being purchased in-store [Allen et al., 2017].

Because last-mile delivery is incurring costs for companies, it brings a need to understand what drives the demand for last-mile delivery. The field have been getting more research in the last few years [Kiba-Janiak et al., 2021], but there is still more to learn. Previous studies have been made that give light to the logistical problems that arise from increased last-mile delivery. These studies also note that there is an environmental aspect to the problem as well, and that it is likely to continue to increase as e-commerce get more popular [Liu, 2014, Savelsbergh and Van Woensel, 2016]. To get a better understanding of what drives the last-mile delivery, other studies have been focusing on consumer behaviour and preferences.

From the perspective of consumers, last-mile delivery is a crucial aspect in their purchase decision [Xing et al., 2010]. As such, several studies have been made which explore consumer behavior concerning last-mile delivery characteristics. These studies focus on delivery speed [Bart et al., 2005, Otim and Grover, 2006], price of delivery [Rao et al., 2011], and time slots of deliveries [Campbell and Savelsbergh, 2006, Agatz et al., 2011]. These studies have later been followed by those more closely examining consumer preferences in last-mile deliveries [Filipsson and Gustafsson, 2021, Nguyen et al., 2019, Buldeo Rai et al., 2018, Gawor and Hoberg, 2018, Ignat and Chankov,

2020]. The findings of these studies have shown that the delivery fee seemingly is the most important determinant for choosing a last-mile delivery option, followed by delivery speed and on-time deliveries [Nguyen et al., 2019, Filipsson and Gustafsson, 2021, Buldeo Rai et al., 2021, Gawor and Hoberg, 2018]. These studies have however, not studied whether the preferences in last-mile delivery can change. Two studies that have looked at preference shifts are done by Ignat and Chankov (2020), and Buldeo Rai et al. (2018). The basis for preference change in these studies are environmental impact of the last-mile delivery [Ignat and Chankov, 2020] and social and environmental sustainability of the last-mile delivery [Buldeo Rai et al., 2018].

Another meaningful way in which preferences may be changed is with the introduction of time as a variable. Time preference theory is widely used to examine temporal behaviour and the discounting of future rewards [Angner and Loewenstein, 2007]. There has however, been little research made on how time preferences affect the preferences of last-mile delivery alternatives. The interplay between different last-mile delivery attributes may be affected by discounting of the rewards in contrast to the costs. Examining the time preferences of last-mile delivery can bring new insights into how last-mile delivery offerings should be made. The implications of changing last-mile delivery preferences of consumers may have both economic and environmental impacts. This study will examine time preference of consumers in last-mile delivery and test the theory of time preference with regards to preference shifts.

1.2 Problem discussion

Time preferences in last-mile delivery can be attributed to both the delivery of the purchased product, and the delay of the payment. When considering the delivery of the product, this is seen as a future reward. This has been examined in previous papers on preferences in last-mile delivery where a common finding is that delivery speed is an important attribute of the delivery. However, where time preference has gone unnoticed is in the study of payment delay. The payment in this scenario is seen as a future loss and is handled different from a future gain in the time preference theory [Hardisty et al., 2013, Baker et al., 2003, Estle et al., 2006]. While it has been relatively well understood that a sooner delivery is considered preferable [Loewenstein and Prelec, 1991, Hardisty et al., 2013], the effects on preference for last-mile delivery has not been studied in regards to payment delay. It is unknown if a delay of payment could alter the choice a consumer makes in last-mile delivery, or if it has no impact at all.

On the topic of consumer preference, there has been a study done by [Ignat and Chankov, 2020] that explores if consumers change their preferred last-mile delivery option after being given information on its environmental impact. Their findings indicate that showing consumers the environmental impact of the delivery without any additional benefits impacts consumers' decisions in a very significant way. Furthermore, [Filipsson and Gustafsson, 2021] do a similar study on consumer preference where they use a mental accounting model to find out which preferences weigh most during the decision of last-mile delivery. They found that delivery fee was the least important attribute of last-mile delivery, which is contradictory to what other stud-

ies have found such as [Nguyen et al., 2019], or [Buldeo Rai et al., 2018], both of which found that delivery fee is the most important attribute. The study done by [Nguyen et al., 2019] also uses the theory of mental accounting model but gets different results than [Filipsson and Gustafsson, 2021]. As the results on the topic of consumer preferences vary between studies it is interesting to further expand on this subject to deepen our knowledge. As such, our study will build upon the findings of these studies, and broaden them with the addition of time preference as a basis for preference change.

When studying consumer preferences in last-mile delivery, the findings are not seldom grouped by different categories. [Nguyen et al., 2019] chose to group their findings by different product categories. The categories in question are convenience goods, shopping goods, and specialty goods. In doing this, they found that no product category differed in terms of last-mile delivery preference, as the delivery fee was considered the most important across the board. In another study, the preferences were compared in the categories of high involvement, and low involvement goods respectively [Filipsson and Gustafsson, 2021]. In both these categories, it was stated that the preference considered to be most important was that of a low emission alternative. However, this finding was not statistically significant. For both low and high involvement goods, it was found that the preference for the delivery fee had the smallest impact. The studies where respondents may answer in different contexts give a possibility to see if preferences are different for different product types. There are however studies that do not take this into account, which is seen as a limitation by the authors of said studies. Examples of this are [Ignat and Chankov, 2020] and [Buldeo Rai et al., 2018]. In these studies, it is assumed that last-mile delivery preferences are the same regardless of product type or product category.

What sets this study apart from others in the same realm is the strong consideration of time preference accompanied with consumer preferences for last-mile delivery. While both of these areas have been researched respectively, time preference has not explicitly been studied as a means of change of consumer preference in last-mile delivery. Time preference together with attributes for consumer preferences gives light to the attribute of payment delay. This attribute is common in online shopping, but it has little previous research, and especially so as a preference attribute. This paper will as such examine if time preference has a greater effect on consumers last-mile delivery preferences than previously established attributes.

1.3 Purpose

The purpose of this study is to broaden the research on the topic of consumer preferences in last-mile delivery. This is done with the inclusion of payment delay as an attribute in last-mile delivery. The basis for this inclusion is time preference theory which enables the study to find what happens to the consumer preferences when a time sensitive attribute is added, and to see if the behavior follows the predictions from the theory of time preference.

1.4 Outline

The structure of the study will be described here. The following section of the study is the literature review where the current established literature on the topic will be presented. In this section any prerequisite theory for the current study will be presented. Following this section is the method, where the chosen method of experiment survey is described and argued for. Then comes the result section where the findings of the study are presented. Finally comes the discussion where the findings are discussed and where conclusions are drawn.

1.5 Delimitations

A major delimitation to this study is the geographical area of the study. The study is only focusing on consumers of e-tailing in Sweden, and may as such not have generalisable results for other countries or the world. The reason behind this is to keep complexity of the distribution of the survey down. Having it only in Sweden enables greater control of the distribution and therefore gives better reliability. Because the study is in Sweden, already established channels of communication can be used for the distribution of surveys which will have a positive effect on the amount of responses.

Another delimitation of the study is the chosen method of experiment survey. This study is conducted with the help of three experiment surveys in which the respondent have to take a stance in given scenarios. This method is therefore a stated preference method, which is known for giving less accurate answers than revealed preference methods [Beck and Ajzen, 1991, Fujii and Gärling, 2003]. However, stated preference methods are easier to manage and distribute, something that is of great importance due to the constraints of this study. Because the goal of the study is to identify how time preference, and specifically payment delay affects the consumer choice in last-mile delivery, the experiment study was deemed as a suitable choice.

There is also a delimitation regarding what attributes are selected for the survey in this study. The selected attributes are derived through argumentation in the literature review in the following section, but there are attributes that are omitted from this study. These attributes could have given a broader perspective on consumer preference in last-mile delivery, but they would also make the study less focused. Adding these attributes would also contribute to making the survey more complex.

One major delimitation to the study is also attribute related and is concerning the attribute of delivery method. This study is focused on home delivery. This is naturally omitting other methods of delivery. The argument for this omission is simply that other methods of delivery would have added little more interesting aspects to the study while massively increasing the complexity of the surveys. While it would be interesting to see how consumers act in regards to time preference when choosing last-mile delivery alternatives for different delivery methods, the main focus of this study remains to examine consumer preferences with the inclusion of time preference theory. As such, the time aspect of the study is of greater importance than that of the delivery method.

This chapter has a literature review of all the background preceding our study. The literature review is divided into relevant subsections for each area of the established literature and cited theory.

2.1 Literature Review

2.1.1 Attributes in last-mile delivery

When studying consumer preferences in last-mile delivery, it is helpful to do so by looking at the different attributes of the last-mile delivery when making an online purchase. In a systematic literature review on consumer behaviour and order fulfilment in online retailing, Nguyen et al. (2018) set out to find how order fulfilment operations affect consumer behaviour. In doing so, the authors identified four key attributes of last-mile delivery. These are *information about the delivery*, *delivery fee*, *delivery speed*, and *order tracking*. These attributes will be explored in greater depth in the following sections. Aside from these attributes the literature review will also add the attributes of delivery method, referring to different types of deliveries.

2.1.2 Delivery date and time slots

Information about the delivery is regarded as information pertaining to the circumstances of the delivery. This could be things such as time slot for the delivery, and delivery date [Nguyen et al., 2018]. In a study exploring to which extent consumers are willing to adopt economically and environmentally sustainable last-mile options, it was found that the most favorable time slot for home deliveries was that of regular office hours during weekdays [Buldeo Rai et al., 2018]. The study was done using a choice based conjoint experiment, showing that there was little difference in utility between all proposed time slots. The same study also examined offering different delivery dates. It was found that consumers preferred earlier deliveries to later deliveries. The attributes of the study allowed for a delivery time of three or five days after which the consumer could choose date freely, this was however not of importance to the consumers, indicating that consumers do not mind not knowing which day their delivery will arrive, and that an earlier delivery regardless was better than a later.

In a choice experiment study with a conjoint analysis of last-mile delivery preferences in the Netherlands, Nguyen et al. (2019) looked at time slots in two different

manners. It was featured as time slots within a day, and more generally as evening or daytime delivery. It was found that the most preferred time slot for home deliveries was that of two hours. Time slot as an attribute was regarded as being the third most important after delivery fee and delivery speed. The study found that consumers generally favored a time slot of either two or four hours rather than a delivery at an unknown time. Nguyen et al. (2019) also found the attribute with the lowest importance to be daytime or evening delivery, where it was found that consumers were indifferent between deliveries during daytime and evening. The study utilized mental accounting theory and found different consumer segments prioritize their mental accounts for money, time, and convenience differently. The segment favoring the smallest time slot and both daytime and evening delivery was the segment of convenience-oriented consumers. However, it was also found that consumers may be part of different segments for different product types. There was little difference found between the consumer segments for convenience goods and shopping goods where the largest consumer segment was the "value-for-money" segment. However, for speciality goods the segment of "price-oriented" consumers was the largest. In the study, convenience goods are a personal care item, shopping goods are a pair of jeans, and speciality goods are a digital camera.

Another study looked at consumer preferences in regards to traditional and innovative last-mile delivery with three different delivery methods of drone delivery, regular delivery, and parcel locker delivery [Merkert et al., 2021]. In the case of home delivery (either via drone or regular delivery), the delivery attribute had varying levels of safety assigned to it. The levels were to leave the package at the door, in a safe place, or to the recipient. When looking at preferences for time slots it was shown that consumers disliked evening deliveries, and preferred daytime deliveries. The most preferred time slot was a two-hour slot during the day, in the case that there was no other last-mile delivery option that had higher safety. The time slot attribute levels varied in length but it was shown that there were no significant difference in preference in either of these, and that time slots over all have little impact on the last-mile delivery choice, making the safety aspect the most deciding factor. This is similar to what was found by Nguyen et al. (2019).

A different study by Goebel et al. (2012) examined if consumers are willing to pay for a service that specializes in delivering packages in specific time slots. The study used a questionnaire to measure availability, working hours, willingness to pay, perceived attractiveness of the service, and average time to pick up packages at collection points. It was found that a time slot based delivery was attractive to those with low availability, and those with many working hours. The willingness to pay for such a service went up in the case that it was found attractive.

The last-mile delivery of groceries is another area where time slots are used. In the study by Milioti et al. (2020) a ranking experiment of consumer preferences in delivery methods was carried out in both UK and Greece to capture different markets. The study examined the preferences under both weekly and urgent orders of groceries with delivery options of home delivery, parcel locker delivery, or pick-up at store. A weekly order is one that is recurring on a weekly basis, and an urgent order is an order that is placed in addition to the weekly order. For weekly orders in Greece it was found that the largest group of the respondents preferred the alternative of a predetermined pick-up time slot of one hour at a parcel locker at a smaller distance

than the grocery store. Urgent orders had the same most preferred choice as the weekly orders, with the difference that willingness to pay for the delivery was lower. The findings were the same for urgent deliveries in the UK. For weekly deliveries the UK prefers home delivery with a time slot of three hours with the cost of £2. Over all home deliveries result in a higher willingness to pay and was more preferred than any other delivery method, as were a smaller time slot.

2.1.3 Delivery fee

Delivery fee in the scope of last-mile delivery is referred to as the cost that the consumer pays for the service of the last mile delivery. The delivery fee is commonly found at varying levels. The most common designs for the delivery fee is to have free delivery, a fixed fee, or free shipping when the sum of ordered goods exceed a break-off value [Nguyen et al., 2018]. One study however, measures the cost of the entire purchase with the delivery included [Gawor and Hoberg, 2018].

In the study by [Nguyen et al., 2019] five different attributes of last-mile delivery was derived from the four key attributes found in the study by [Nguyen et al., 2018]. Out of these five attributes it was found that the delivery fee of the last-mile delivery had the most significant impact on what consumers prefer in their last-mile delivery. The other attributes were delivery speed, time slot, daytime or evening delivery, and delivery date. It was also found that the preferences for the other attributes decreased when delivery fee increased. The study used mental accounting theory and did as such propose that consumers primarily are guided by their mental account for money. Consumer segments identified by the study shows that the segment of price oriented consumers mainly choose the cheapest delivery fee possible when shopping. As previously mentioned, there is another segment of consumers who change behaviour when shopping for different goods. The findings that delivery fee has the most significant impact on consumer preferences is shared by many different studies [Milioti et al., 2020, Merkert et al., 2021, Buldeo Rai et al., 2018, Filipsson and Gustafsson, 2021, Gawor and Hoberg, 2018, Ignat and Chankov, 2020, Garver et al., 2012]. These studies does however, differ in their purpose and a summary of the studies can be found in Appendix 1 7.1.

The study by Gawor and Hoberg (2018) examined how consumers value time and convenience when shopping online. It was a choice based conjoint analysis on US shoppers. The attributes used for the study was delivery fee, delivery speed, and convenience. Convenience was a measure of how the delivery was made, where home delivery was regarded as more convenient than consumer pick-up. Like Nguyen et al. (2019), Gawor and Hoberg (2018) found that delivery fee was most important for consumers in choosing a last-mile delivery option. Like Nguyen et al. (2019), Gawor and Hoberg (2018) also found four different consumer segments. Three of the segments have been recognized in earlier literature. These were the "budgeter" [Bask et al., 2013], focused on the cheapest delivery, and the "convenience shopper", focused on the nearest delivery, and "balanced buyer", who value each attribute the same [Rohm and Swaminathan, 2004]. The addition made by Gawor and Hoberg (2018) was the "lead time shopper" who values the fastest delivery. Of these segments it was shown that the "budgeter" was the biggest segment with 48.4% of the participants. The study had three different products with different price of \$129.99, \$479.99, and

\$1279.99. The distribution of the consumer segments got more equal as the price of the product went up. This proposes that someone who is a "budgeter" for a cheap product might become a "lead time shopper" for a more expensive product.

There is also a study on consumer preferences in last-mile delivery with the focus on environmental sustainability. The study wants to find out to what extent consumers are willing to choose environmentally friendly options, and how said options should be composed [Buldeo Rai et al., 2018]. The study was like many others a choice based conjoint study. The findings of the study shows that nearly half of the respondents take the environment into account when making a purchase, but also that more than half of the respondents are unwilling to pay for a more environmentally sustainable delivery choice. Consumers were however, willing to wait longer for their deliveries if fewer kilometers were driven. Around 52% of the respondents find it important that fewer kilometers is driven for their delivery, and 48.5% finds it important that fewer kilometers are driven in their neighbourhood. This finding is in line with earlier literature where consumers are negatively impacted by local delivery activities [Macharis and Milan, 2015]. Consumer preferences in the study by Buldeo Rai et al. (2018) are similar to those found by Nguyen et al. (2019), where delivery fee is the most important attribute, followed by delivery speed and time slot. The most preferred last-mile delivery option was found to be free, have next-day delivery during office hours, and be delivered to an address of choice by the consumer.

In another study, the focus is to examine if consumer preferences in last-mile delivery changes when presented with new information about environmental and social sustainability impacts [Ignat and Chankov, 2020]. The study used the theory of planned behaviour and a stated preference survey in Germany to collect the data. The findings were that information on environmental impact significantly affected the consumer preferences in last-mile delivery. Furthermore, the study had findings similar to Buldeo Rai et al. (2018) where consumers are willing to wait longer for their deliveries if they are more environmentally sustainable. However, contrary to Buldeo Rai et al. (2018), Ignat and Chankov (2020) found that consumers also were willing to accept a higher delivery fee if the delivery was more environmentally sustainable. This was true both in the case of the consumer being given incentives to choose the environmentally friendly option, and not.

2.1.4 Delivery speed

Delivery speed in last-mile delivery is referred to as the time it takes for the delivery to be completed, regardless if this is a home delivery, or a delivery to a consumer pick-up point. Consumers value a fast delivery and it is often found that consumer preferences generally are weighed toward the fastest available delivery option [Nguyen et al., 2019, Gawor and Hoberg, 2018, Filipsson and Gustafsson, 2021, Buldeo Rai et al., 2018, Garver et al., 2012].

Many papers are agreeing on that consumers value a speedy delivery. This remains true even under specific circumstances, as in the case of Nguyen et al. (2019), where consumer preferences are examined for convenience goods, shopping goods, and speciality goods. The attribute of delivery speed had three levels of same day delivery, next-day delivery, and delivery within two to five days. The most preferred of these were same day delivery, and least preferred were delivery within two to five

days. Nguyen et al. (2019) also found a consumer segment who values time and convenience the most. In the similar study by Buldeo Rai et al. (2018) it too was found that delivery speed was an important last-mile delivery attribute. The attribute in the study had six levels, within two hours, tomorrow, day after tomorrow, within one to three days, three to five days, minimal three days but free choice of date, minimal five days but free choice of date. This study found delivery tomorrow to be the most preferable. In this case the fastest delivery option was not the most preferred, indicating that consumers want fast delivery, but not too fast delivery. In comparison with the other attributes in the study, it was found that delivery speed was the third most important attribute after delivery fee, and the return possibility. The study also shows that some consumers are willing to wait for a longer delivery if it means that the delivery has a less negative environmental impact.

In the findings presented by Gawor and Hoberg (2018), it was shown that the second largest consumer segment after the "budgeter" was the "lead time shopper", which is the segment that values a fast delivery. The study found that a faster delivery speed was preferred for all three products that was in the study, which is similar to what Nguyen et al. (2019) found. Gawor and Hoberg (2018) also set out to find a monetary value of time and convenience in their study. The aggregate findings were that each additional day of delivery was worth \$3.61 and the travel time to a pick-up point was worth \$10.62 per hour. The value of time changes for each consumer segment, and the segment with the highest value of time is the "lead time shopper" which values each additional day of delivery to be worth \$8.08.

2.1.5 Order tracking

Order tracking in last-mile delivery is the service offered by many last-mile delivery companies that let the consumer see what the status of their order currently is, and when it is expected to arrive [Nguyen et al., 2019]. A study by Garver et al. (2012) examined how consumers choose last-mile delivery services for their online purchases with an adaptive choice model. After delivery fee and delivery speed, it was found that tracking availability was important for the choice of last-mile delivery. In another study on differences in physical distribution service quality between retailers and e-tailers it was found that a tracking availability contributed to improve the physical distribution service quality [Xing et al., 2010]. Other studies have also found that order tracking plays an important role in consumer retention, and repeat purchases [Rao et al., 2011, Otim and Grover, 2006, Cho, 2015];

2.1.6 Delivery method

Delivery method is the final attribute examined in this literature review. It is not featured as a key attribute in the literature review by Nguyen et al. (2018), but it is mentioned that there are three main delivery methods. The methods listed are attended home delivery, unattended home delivery, and consumer pick-up. consumer pick-up includes both pick-up at a retailer, post office, or automated parcel locker. In this review we will combine attended and unattended home delivery to just home delivery, since this is the most common way to do it in the literature in this area. Delivery method is frequently used as an attribute in the literature on consumer

preferences in last-mile delivery [Buldeo Rai et al., 2018, Gawor and Hoberg, 2018, Ignat and Chankov, 2020, Merkert et al., 2021, Milioti et al., 2020, Filipsson and Gustafsson, 2021].

Home Delivery. Convenience is one of the more important criteria for consumer preference when it comes to choosing a delivery service, and home delivery is considered to be the most convenient delivery method [Gawor and Hoberg, 2018, Buldeo Rai et al., 2018]. In the study by Goebel et al. (2012) home delivery is seen as the most favorable delivery method, and a time slot based delivery service is proposed to make home deliveries feasible for more people. It was found that this service was sought after by those who had many work-hours in a week and generally low availability at home. Ignat and Chankov (2020) studies the effect of environmental sustainability information on consumer preferences in last-mile delivery, and finds that consumers are willing to choose a less convenient delivery location if that means a more sustainable delivery. A less convenient delivery location is in this context a parcel locker, or other pick-up location, as opposed to home delivery. It is also stated that home deliveries have higher emissions since these deliveries are harder to consolidate, resulting in partly empty delivery trucks.

Another study, by Milioti et al. (2019), was looking at the delivery of groceries in Greece and the UK in both weekly and urgent cases. It was found that Greek consumers preferred delivery to a parcel locker for both weekly and urgent cases, and the UK consumers preferred home delivery for weekly orders, and parcel locker for urgent orders. In a study by Xiao et al. (2018), delivery options in China was examined. A choice study was performed, and various parts of the city Shenzhen was surveyed. It was found that home delivery was the most favored delivery option, but that the availability of parcel lockers or other pick-up points was more valuable than a zero-fee for delivery.

consumer Pick-up and Parcel Lockers. When looking at determinants for consumer pickup, studies have found that perceived value, convenience, privacy security, and reliability are most important for consumers to adopt a self-service delivery method [Yuen et al., 2019].

The study by Buldeo Rai et al. (2018) shows that consumers highly prefer to get deliveries to an address of choice. However, they also find that consumers are willing to pick up the deliveries in the case that free shipping and return is offered. The study by Gawor and Hoberg (2018), used a survey for their study and had a sample size of 550. Of these, 68.2% stated that pick-up at a retail store was a feasible delivery option. However, despite many listing it as feasible, it was the least preferred delivery method with both all-day home delivery, and time slotted home delivery being more preferred.

In the study by Merkert et al. (2021), there was no comparison of preference between the pick-up attribute and the two different home delivery options presented. However, it was noted that pick-up at a parcel locker was preferred as an alternative for expensive purchases. The reasoning for this was that the delivery to a parcel locker is deemed as more safe than unattended home delivery. In the study by Milioti et al. (2019) it was found that consumers preferred using parcel lockers and home delivery more than they preferred going to the store to pick up their purchase. This was true for both weekly and urgent deliveries in both Greece and UK which was the basis of the study.

A study by Vakulenko et al. (2018) on values when using parcel lockers, found that the main values with parcel lockers were that they could be placed close to consumers, that they are easy to use, and that they enable faster parcel deliveries since they are automated.

A summary of studies on preferences in last-mile delivery can be found in Appendix 1, 7.1.

2.2 Theory

2.2.1 Time Preference Theory and Hyperbolic Discounting

The idea of time preference in economics comes from the time preference theory of interest as proposed by Irving Fisher (1930). The theory is about consumers preference to spend in the present rather than in the future. The idea is that the value of time is related to each consumers utility function for saving money (spending in the future), or spending money now. If a consumer has a high time preference, the time preference will influence the consumers utility function for spending, resulting in a higher utility for present spending, rather than future spending. Similarly, if a consumer has low time preference or no time preference at all, the consumer will instead favor spending in the future rather than the present.

The time preference is most commonly measured with a discounted-utility model [Green and Myerson, 1996, Angner and Loewenstein, 2007]. With this model, consumers are assumed to choose between different timed options in accordance to the utility of each option [Loewenstein and Prelec, 1992, Frederick et al., 2002]. Using this model, utility is thought to be discounted similarly for every type of consumption (product, experiences). As discussed by Angner and Lowenstein (2007), one of the ways to handle the utility discounting is to assume that utility is discounted exponentially. Exponential discounting has however been found to be lacking [Angner and Loewenstein, 2007], and a better suiting alternative has been found in hyperbolic discounting [Laibson, 1997, Ainslie, 1992, Loewenstein and Prelec, 1992, Angner and Loewenstein, 2007].

The two most common discounted-utility models, or time discount functions as they often are called, are shown in Figure 2.1. The Y-axis represents the value of the discount factor, going from zero to one. The X-axis represents a unit of time going from present to the future.

Exponential discounting means that the value of the discount factor decreases by the same amount for each unit of time [Samuelson, 1937]. In terms of time preference for spending money it would mean that a consumer would be less inclined to spend money the further into the future time goes, which means that the consumer would want to spend money sooner. In terms of last-mile delivery, the consumption of the good, and therefore the realized consumption of the money happens when the consumer gets the product they have ordered. The time preference for consumption is therefore connected to the delivery speed of the delivery. A consumer with a high time preference will have a steep time discount function, and as such have a high time discount rate, and hence have a higher utility to get the product sooner rather than later. The expression that describes the exponential discounting model can look

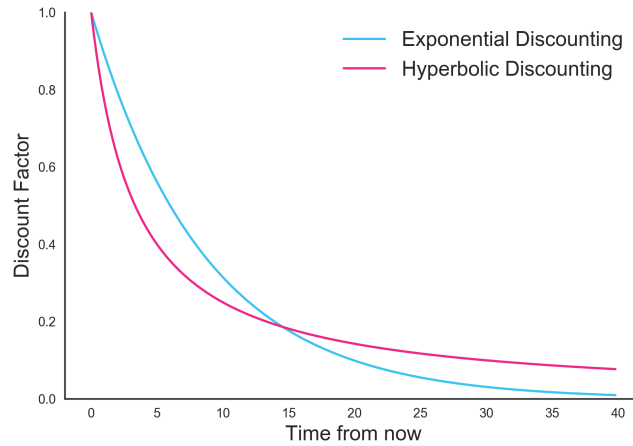


Figure 2.1: Different time discount functions

like this:

$$E(t) = e^{-rt}$$

Here, r denotes the subjective discount rate, and t denotes time.

Hyperbolic discounting is different from exponential in that the discount factor decreases with a steeper decline in the beginning of the time-period, to later plane out [Mazur, 1987, Green and Myerson, 1996]. As seen in Figure 2.1 the hyperbolic discounting function has a higher lowest value over time, but a lower value than the exponential function in the beginning of the time period. The expression that describes hyperbolic discounting can look like this:

$$H(t) = \frac{1}{1 + rt}$$

Same as before, r denotes the subjective discount rate, and t denotes time.

In a study discussing hyperbolic discounting, Prelec (2004) uses the term "decreasing impatience" to describe the effect of hyperbolic discounting. The meaning of the phrase being that consumers who have hyperbolic discounting rates prefer immediate rewards now, and still prefer later rewards sooner, but to a lesser extent. The value of a future good is as such not discounted as much as a delayed present good. In another study about discount rates for environmental choices by Richards and Green (2015) finds that consumers tend to discount choices pertaining to the environment less than purely financial choices. The surveyed consumers showed that the most environmentally engaged consumers had the lowest discount rates for environmental choices. The study also found that financial choices had a discount function more akin to exponential discounting whereas the environmental choices had a hyperbolic discounting function. These findings are in line with the description of decreasing impatience by Prelec (2004) as environmentally aware consumers express this behavior.

The study by Prelec (2004) is backed up by older studies on time discounting [Thaler, 1981, Ainslie and Haslam, 1992]. These studies finds that people prefer one apple today rather than two apples tomorrow, but also two apples in 366 days rather

than one apple in 365 days [Thaler, 1981]. Other findings are that people prefer \$100 today to \$200 in two years, but also \$200 in eight years to \$100 in six years [Ainslie and Haslam, 1992]. This behavior is also called preference reversal in other studies [Mazur, 1987, Seinstra et al., 2018] and has been used as an argument against exponential discounting models since these fail to capture this behavior.

Another aspect of time preference theory is what is called present bias. Present bias is the notion that people are impatient and want gains or benefits immediately without any concrete reason [Benhabib et al., 2010, O'Donoghue and Rabin, 1999]. The study by Benhabib et al. (2010) examine the fixed-cost present bias theory, in which the present bias is expressed as a fixed cost instead of using a discount function. They find that the present bias in the study appeared to be worth \$4 to the respondents, regardless of what the gain was. This would mean that impatience plays a smaller or larger role when the gain is smaller or larger. In the context of these findings you would be more inclined to wait one extra month if your gain would increase from \$5000 to \$6000, and less inclined to wait for \$10 to increase to \$12 in a month. This is because \$4 relatively is a larger part of the sum in the latter case. This way of discounting the future utility through a fixed-cost present bias captures the same preference reversal as does hyperbolic discounting. Present bias does however, also account for what is called the magnitude effect.

The magnitude effect states that smaller gains are discounted more than bigger gains [Thaler, 1981, Benhabib et al., 2010, Baker et al., 2003]. Fixed-cost present bias theory accounts for this when discounting future events, whereas hyperbolic discounting does not. This is because hyperbolic discounting only scales with time and not a relative value. The magnitude effect has also been used when looking at discounting loss as well as gains [Hardisty et al., 2013, Baker et al., 2003, Estle et al., 2006], the findings of these studies however, is that the magnitude might not present for losses. The study by Estle et al. (2006) showed that losses of \$100 and \$100000 were discounted similarly, and the likewise discounting was found by Baker et al. (2003) when looking at losses of \$10, \$100 and \$1000. Hardisty et al. (2013) however, argues that these studies are too narrow in design, only testing smaller and sooner gains and losses as well as later and larger gains and losses.

The study by Hardisty et al. (2013) looked at immediate and future gains and losses. They used \$10 and \$1000, and found a higher discount for the \$10 gained compared to \$1000. In losses however, they found a negative discount rate for the \$10, and a slightly higher positive rate for \$1000. The discount rate for gains were in accordance to the magnitude effect, but the losses showed the reverse. The implications of these findings were that people prefer to get rid of small losses immediately rather than hanging on to them. In this specific case, waiting to pay \$10 rather than paying it immediately would have made the loss feel like more than \$10. This did, as discussed, not hold true for the larger sum of money.

In losses and gains people tend to want the gains sooner to avoid waiting [Loewenstein and Prelec, 1991, Hardisty et al., 2013]. This because of the inherent risk of putting things off in the future and the negative feeling of longing. A future gain may not arrive, whereas a present gain, for example money, can be put into a bank-account and interest could be made on it. This contributes in making discount rates for gains high. In losses, people want to have them over with sooner rather than later to not have to dread them [Loewenstein, 1987]. While it is balanced out by

a loss being easier to overcome by saving money in the meantime, the dread from having a future loss weighs heavier [Loewenstein, 1987, Hardisty et al., 2013]. This contributes to losses having a lower discount rate.

2.3 Proposition development

To focus the work of this study, two propositions will be developed. These will be based on the previously presented literature, as well as the theory of time preference and hyperbolic discounting.

In studying consumer preferences in last-mile delivery, studies have differentiated what products the consumer are buying. Nguyen et al 2019 uses three different product categories that are, convenience goods, which could be groceries, shopping goods, which could be clothes, and speciality goods, which could be electronics. They find that consumer preferences for last-mile delivery have non-significant differences in regards to product category with delivery fee and delivery speed being most important. Furthermore, there is the study by Gawor and Hoberg (2018) which uses three differently priced products, namely, a digital camera, a smartphone, and a laptop. Here the findings were that delivery fee was the most important attribute for all three products, home delivery the most preferred delivery method, and a fast delivery preferred. The delivery speed did however vary between products as it was found that consumers wanted faster deliveries for the laptop and the smartphone than they did the camera, which indicates that there might be an effect on delivery speed based on product value.

In the study by Filipsson and Gustafsson (2021) broader terms are used, which are low respectively high involvement goods, pertaining to how much effort the consumer puts in to the purchase. Here, vacuum cleaner bags are a low involvement good, because you do not care that much about which exact vacuum cleaner bag you choose. A vacuum cleaner would be a high involvement good where there are many different parameters determining the value of the of the vacuum cleaner. They found no statistical differences between the different attributes of last-mile delivery depending on type of product. They did however, contrary to other studies here, find that delivery fee was statistically significantly least important to consumers for both types of product. Finally there is the study by Milioti et al. (2019) where only groceries were examined, but at different levels of urgency. In the findings, home delivery had the most positive impact on a choice, and cost had the greatest negative effect on a choice.

From these studies we can conclude that while there is some difference between product categories, and reported findings of attributes, overall there seems to be no tangible difference of last-mile delivery choice depending on product type. We also see that the majority of these, and previously mentioned studies have found delivery fee and delivery speed to be the most important attributes in last-mile delivery.

The preference of fast delivery is to be expected when considering time preference theory such as present bias and hyperbolic discounting. Because gains are discounted over time, it is in line with the theory that a consumer would prefer to have a good sooner rather than later. Something that is yet to be studied however, is how the loss of paying for the last-mile delivery affects the choice the consumer make. Since

gains and losses are discounted differently [Hardisty et al., 2013] there could be a preference reversal in what last-mile delivery option is preferred depending on how the loss of paying is discounted. If the gain from getting a product sooner is larger than the loss of paying for it, a consumer could be incentivized to choose a faster delivery alternative despite it being more expensive. Because we know that delivery fee and delivery speed are the two most contributing attributes to choosing a last-mile delivery alternative, the interplay of these are interesting to study. Adding the dimension of time, we could potentially find if a larger future loss in compensation for faster delivery is acceptable, in a case where the same immediate cost for the same delivery speed would not be. Hardisty et al. (2013) tells us that losses have lower discount rates than gains, indicating that we are more sensitive to losses. They expand on this and also state that bigger losses are discounted more than small losses, and furthermore, that consumers have a tendency to postpone a bigger loss rather than a small loss.

When discussing time preferences of last-mile delivery and the timing of payment, we consider the payment of the entire purchase, that is, both the product and the delivery fee. This is because of how payment for online shopping usually works. Furthermore, the delay of paying for the purchase is considered at two different levels. These are immediate, and 30 days. Aggregate shopping and delivery information from 25 of the biggest retailers in Sweden can be found in Appendix 1 table 7.2. From this, we formulate our first proposition:

Proposition 1: Consumers present bias will have them favor a faster, more expensive delivery option, if the payment for the entire purchase is delayed by 30 days rather than being immediate, regardless of product type.

From the previous section we know that a low delivery fee, and a fast delivery is preferred in last-mile delivery. From time preference theory we also know that small gains are discounted more than bigger gains. Furthermore, we know that small losses have low or negative discount rates [Hardisty et al., 2013]. From this we can derive that a consumer would prefer a fast delivery for a low-price product, since the low-price product is likely to be discounted more heavily. The consumer would also like a low delivery fee based on earlier findings. However, when shifting the payment of this fee into the future we may see a preference reversal. Because small losses can have a negative discount rate, waiting to pay a small sum in the future can be less preferred than paying immediately because of dread for the coming loss [Loewenstein, 1987]. From this we can propose that the worst last-mile delivery option, and therefore the one least likely to be preferred by consumers to be one with a low-price product, fast delivery speed, low delivery fee, and a future pay-date.

Proposition 2: For low-price products, the preference for cheaper-and-later delivery over expensive-and-earlier delivery shifts when the payment date for the purchase is delayed for 30 days. For high-price products, payment delay has lower effect.

This chapter will describe the chosen method used to discuss the propositions of the study. Choices regarding the method are made and explained here. The validity and reliability along with the data analysis is also discussed in this chapter.

3.1 Experiment study

The interest in the study lies in the attributes of last-mile delivery. Among these attributes the most interesting one is pertaining to the delay of the payment, as discussed in the previous chapter. Since we are interested in how the delay of the payment affects the preferences for the other attributes, an experiment study is chosen as the research method. It is carried out as a survey experiment. The experiment is divided into three experiment groups. Each group will receive a different survey to respond to. These surveys present different scenarios for the respondents to take a stance to.

The suggested approach differs from other studies in this area as seen in the previous literature review. Most other studies uses observational studies and conjoint analyses [Garver et al., 2012, Filipsson and Gustafsson, 2021, Nguyen et al., 2019]. The main difference here being that the other studies are interested in the interplay between all attributes in last-mile delivery. Since the present study has a more narrow focus, a different approach was appropriate. The survey experiment is a stated preference study. As previously mentioned, a revealed preference study would have been another option. However, these studies have increased complexity since real purchases might be affected by a plethora of variables. Because complex studies often are more time consuming, and results in fewer responses, a more simple study is preferred [Ghauri et al., 2020]. The stated preference study is suitable in this case. Furthermore, a stated preference study allows the creation of scenarios not present in the real world.

The survey will be distributed online. The main advantage to using an online survey is the low cost of distribution, and low time in handling. The responses are easy to convert into data since they are already digital. Another positive aspect of an online distributed survey is in the sample selection. It can be distributed in such a way that it reaches just the intended target group. The downside to the sampling is however, that people who don't use online services will be omitted from the sample. The main downside to online surveys lie in the response rate which tend to be lower compared to other alternatives [Ghauri et al., 2020].

3.1.1 Survey experiment design

The survey will as mentioned, be split into three versions, corresponding to each of the three experiment groups. The groups are divided in such a way that there are two experiment groups and one control group. The control groups serves the purpose of ensuring that the question in the survey has been understood. Doing this enables the conclusion that the experiment group surveys also have been understood. The remaining two experiment groups are presented different surveys with questions altered to fit the two propositions. The survey itself is structured in three parts.

The first part is about demographic information about the respondents of the survey. This part is the same for all versions of the survey. This information is anonymous and presented as such to the respondent to encourage honest answers [Ghauri et al., 2020]. The survey collects information about gender, age cohort, current occupation, and frequency of online purchases. This information allows the different experiment groups to be compared to each other, and to ensure that the groups have similar characteristics of respondents. This information can also be compared to previous studies in cases where it is applicable.

The second part of the survey is the main questionnaire. It starts with a presentation of what is expected of the respondent. It is a short description, informing the respondent that they are going to make two choices (two survey questions) between two different scenarios (last-mile delivery alternatives) in last-mile delivery. These two choices correspond to the two propositions, but this is not presented to the respondent.

The first question (Q1) of the survey is for H1. The sought after information is whether a consumer would prefer the faster, more expensive alternative if it is paid for at a later date, or the slower, less expensive alternative if it is paid for immediately. As such, the two alternatives presented to the respondent differ in delivery fee, and delivery speed. Home delivery, product type, and payment delay are held constant for both alternatives. To be able to test H1, payment delay differs between the experiment groups. This allows comparison of Q1 from the different experiment groups.

The second question (Q2) of the survey is for H2. Here, the interesting aspects are whether consumer preference for delivery of low-price products shifts when the payment is due immediately or at a later date. To find this, the two different alternatives have varying delivery fee, delivery speed, and payment delay. Home delivery and product type is held constant. To be able to test H2, product type differs between the experiment groups. The values of all the attributes used in the survey are discussed in the next section of this paper.

Following both of the questions are a seven-point-scale to indicate the likelihood of the consumer making the same choice in a real scenario. This part of the survey is added to give more depth to the responses.

To ensure that a respondent is not biased by previous answers, the different experiment groups consist of mutually exclusive but demographically similar respondents. This way, each respondent will only have completed one survey, allowing the response to be free from question order bias [Ghauri et al., 2020].

The last part of the survey contains a control question about if the respondent have answered a similar survey in the past weeks. This final question is in the survey

to ensure validity of the responses. The question is in the survey to ensure that a respondent is only part of one of the three experiment groups.

3.2 Variables and parameters

As discussed in the literature review in the previous chapter, there are different attributes that defines a last-mile delivery option. The studies that precedes this one have examined these attributes to a great extent, as well as consumer preferences for these attributes. This study builds upon the findings of the previous studies in the area while adding emphasis on the delivery fee, speed, and method all while focusing on the time aspect of when the payment is being made.

Because the focus of this study covers a subset of the attributes discussed in the literature review, not all attributes relevant as variables in this study. When choosing delivery method, the only alternative of interest to the current study is home delivery. This will be held constant for all surveys, and therefore no consideration has to be made for other delivery methods. Two attributes that are omitted from the current study are time slots and order tracking. Order tracking is omitted in part to keep survey complexity down, and in part because its contribution to the last-mile delivery choice is relatively small [Garver et al., 2012]. Time slots are also omitted on the same grounds as order tracking. The attribute has little impact on the choice of last-mile delivery and therefore is of relative less importance to this study [Nguyen et al., 2019].

The attributes found to be most important to consumers in making a last-mile delivery choice has been delivery fee and delivery speed, as found in several studies [Nguyen et al., 2019, Gawor and Hoberg, 2018, Milioti et al., 2020, Merkert et al., 2021, Filipsson and Gustafsson, 2021, Buldeo Rai et al., 2018, Ignat and Chankov, 2020]. Naturally these attributes will be used in the current study as variables in the survey. The values of the variables are derived from both previous studies and the values shown in table 7.2 in Appendix 1. This data is extrapolated from Sweden's 25 biggest retailers. This information was manually gathered by the author by completing all of the necessary purchasing steps except for completing the order. Doing this allowed collection of the most common delivery speeds and delivery fees, as well as payment methods.

Working with table 7.2 in Appendix 1, the delivery fee variable in the survey was given two levels of 30 and 60 SEK, given their frequent presence in real world scenarios. Likewise, the variable for delivery speed in the survey was given the levels of either 1-3 days or 5-7, both of which occurred in real world scenarios. It should be noted here that most real world scenarios had the lower value of 1-3 days for delivery speed, but for the sake of having differentiation in the survey, two levels were needed.

The next variable in the survey is the payment delay. To give realistic values to this variable, data from table 7.2 in Appendix 1 was used, as previously mentioned. Payment delay is a core attribute in this study as the propositions are hinged on when the payment is taking place and how that affects the decision making of the consumer. With this in mind, the two most common different payment methods were used as basis for the variable in the survey. The two different levels that were chosen were instant payment, and payment in 30 days. However, in the case of

most etailers used to compile the data in table 7.2 in Appendix 1, multiple different payment methods were present, such as part payment plans and purchasing using credit. This study's survey would be more true to life if it had a greater diversification of different payment methods to reflect reality. However, it would serve no purpose in discussing the propositions and would increase the complexity of the survey. With this reasoning the variable levels of payment delay were set as discussed.

Finally, to be able to use the propositions of the study, the last-mile delivery option must be hinged on a product or a product type. Previous literature have used products in two main ways. Either as a discrete product [Gawor and Hoberg, 2018], or more broadly as a product category [Nguyen et al., 2019] or product type [Filipsson and Gustafsson, 2021]. The products used by Gawor and Hoberg (2018) was a digital camera, a smartphone, and a laptop. The categories used by Nguyen et al. (2019) was convenience, shopping and speciality. These categories were explained to mean groceries for convenience, clothes for shopping, and electronics for speciality. Finally, Filipsson and Gustafsson used high and low involvement as measures for product type. This was a measure of how much a consumer generally thought about the purchase they were making. Their study used a vacuum cleaner for high involvement, and vacuum cleaner bags for low involvement goods.

This study is not interested in a particular product for discussing the first proposition. However, a product is still needed for the survey to work properly, and the proposition states that it is indifferent to what product it is. The product chosen for this is clothing, with the argument that consumers can relate to buying clothes regardless if it is something they regularly do. For the second proposition, two different products are needed. Namely a low-price and a high-price product. The choice of product here is a laptop for the high-price product, and printer ink for the low-price product.

3.3 Sample selection

This study uses a purposive sampling strategy, and is utilizing a convenience sample. A purposive sampling strategy is advised against for getting data suitable for generalisation. However, because this study is being made with constraints to time and budget, a convenience sample is a good choice [Ghauri et al., 2020]. A drawback of the convenience sample is that it is based on the authors' proximity to respondents. In this case it would mean that the sample would be over represented by students in south-eastern Sweden. However, this is mitigated by using an online survey as it has the potential for broader reach. To further ensure a spread of respondents the survey leads with anonymous demographic questions. This allows the study to take potential biases into account, as well as deliberately distribute the survey to under-represented demographics.

The medium for distribution of the survey is through social media. The chosen social media is Facebook with the rationale that the author already have established different contact networks on the platform, and for its general popularity. These networks are used for the distribution of the survey. The structure of Facebook also allows for the distribution of the survey to mutually exclusive respondents so as to reach as many unique respondents as possible. This is also beneficial when working

with an experiment study as the goal is for any one respondent to only be part of one experiment group.

There is a drawback to only using Facebook as platform since there are potential respondents who are not using the platform. This could be mitigated by using other social media platforms, or other online platforms. However, the study will still miss out on respondents who do not use the internet for social purposes. Furthermore, using more than one social media could be problematic for the experiment study as it would be harder to control the distribution of the surveys. An upside to using Facebook is that it as of 2021 was the most popular social media in Sweden according to a report from The Swedish Internet Foundation [Internetstiftelsen, 2022]. It was found that 94% of the Swedish population (aged 16+) was using the internet, and that 71% of these people have used Facebook in the last year. This indicates that there is a large group of potential respondents to the survey.

Because this study is an experiment study, the idea is to distribute different surveys to different experiment groups. This is relatively easy to do with the help of social medias since they are built on contact networks. Because we don't want any bias affecting the answers of the surveys, no one person should be in multiple experiment groups. This means that the surveys have to be distributed to mutually exclusive contact networks. The use of Facebook simplifies this because of its group-feature. Groups on Facebook can be for certain topics or places, and allows people to join for a focused discussion. Groups related to locations usually attract people who live near or at these locations, meaning that these groups have members that seldom are part of other groups of the same nature. These groups are therefore suitable for the distribution of the survey. To further control that one respondent only answers one survey, a control question concludes the survey, as previously mentioned. Finally, the different survey experiment groups should be equal in their respondent characteristics. This means that one group should not only consist of middle aged, stay-at-home men, and another only consist of students. To control for this, the survey leads with the demographic section. By continuously analyzing this information it is possible to make sure that each survey get similar respondents.

The contact networks the three surveys are distributed to initially are three different location-based Facebook groups. These are of roughly equal size, each having about 12000 members. The surveys may come to be distributed to more groups if deemed necessary for demographic- or response amount reasons.

3.4 Validity and reliability

3.4.1 Reliability

A threat to the reliability of this study is use of a stated preference method. A stated preference method is likely to yield less reliable information than a revealed preference method would [Hensher, 2010, Carlsson and Martinsson, 2001]. This is because of what is known as hypothetical bias. Since stated preference methods construct hypothetical situations rather than taking data from real situations, they are inherently at risk of hypothetical bias. This bias is simply referring to changes in respondents choices that comes from the fact that the situation is hypothetical rather

than real. This is enhanced by the fact that the study in its design only account for a few of the variables that could come up during a real purchase situation [Alriksson and Öberg, 2008]. This is however, mitigated by making the study replicate a real situation [Ghauri et al., 2020, Carlsson and Martinsson, 2001]. In this study, this is done by using the same last-mile delivery attributes and product types as commonly found in the previous studies examined in the literature review. Furthermore, the setting in which the respondents choose the preferred last-mile delivery alternative in the survey is similar to the way a last-mile delivery alternative would be chosen in a real setting as it is being made in an online context, and contains similar information as would a real setting. Furthermore, it is beneficial for this study to use hypothetical scenarios as it allows testing of situations that do not occur naturally. That a situation does not occur naturally does not mean that we cannot learn from it. This study focuses on exact scenarios with slight differences, which would be hard, if not impossible, to find in a real setting.

Another way this study combats the hypothetical bias is to add a likelihood-slider. This allows the respondent to state the likelihood that they would choose the stated answer in a real scenario.

Because this study does not control the way the respondents answer the survey, it is not protected against any participant error. This means that the result of the survey might be impacted because of the circumstances of the respondent while they are taking the survey. Participant error is mitigated by making the survey simple, and straightforward. The contents of the survey is not emotionally charged, meaning emotional states should have little impact on the responses. A bias the study is protected against is the participant bias. Because the survey is answered online, and is completely anonymous, it encourages honest answers, increasing the reliability of the responses.

3.4.2 Validity

The construct validity of this study is robust. The first chapter of the study provides background to the topic and introduces the problem. The background shows that there is a gap in the existing research in consumer preferences in last-mile delivery with regards to time preference. The problem discussion adds to this with the consideration of payment delay as a connection to time preference, and a shift in last-mile delivery hinged on payment delay. The previous literature is then discussed in the literature review, along with the theory on time preference. The literature review discusses methods and findings on the topic of consumer preferences in last-mile delivery. This is where the attributes, for which the consumer have preferences, are explained. These attributes are of key importance to this study, as they are used in the experiment study explained in this chapter.

In the proposition development section, the relation between product type, payment delay, and the assumed preferred last-mile delivery choice is explained and argued for. In Q1, it is clear that payment delay is the independent variable which will affect which last-mile delivery option the consumer will prefer, making this the dependent variable. In Q2, the product is the independent variable which will affect what last-mile delivery choice the consumer will make, and so, making this the dependent variable. The argumentation for this lies in the circumstances of the last-

mile delivery option. In Q1, the question is designed to let payment delay have the most significant effect on the last-mile delivery choice by having this vary between experiment groups, holding all else equal. Similarly, in Q2, the question is designed so that the product varies between the experiment groups, holding all else equal. This strengthens the internal validity of the study.

To confirm that the dependent and independent variables are interpreted as intended, one of the three experiment groups is a control group which is supplied with a Control Survey, as previously mentioned. This survey will show whether the survey questions are working and whether the result from the other experiment groups are trustworthy.

Another issue with the validity of the study is whether the respondents understand the survey they are answering. If the survey is unclear the data will not be trustworthy. To ensure high understandability of the survey, a pilot test of the survey is performed by sending it out to a select group of people. Feedback from the pilot test is gathered and implemented into the final design of the study.

The external validity is hinged on the response rate of the surveys. To be able to generalize the findings of this study to be applicable for every online consumer in the Swedish market, the sample need to be diverse. Because the study uses a convenience sampling method, and is utilizing location-based groups in social medias, it is a risk that respondents are not diverse enough. To combat this, the study will be distributed in groups that are likely to have little overlap. This would ensure that the surveys get unique respondents. Even though this preventive action is taken, it is difficult to guarantee that the results are completely generalisable.

3.5 Data analysis

Because the dependent and independent variables in the survey are of categorical nature, the data will not be normally distributed. This narrows down the choice of method for data analysis to only include non-parametric methods.

To be able to argue around the two propositions, each of the correlating survey questions need to be analysed. Both of the main survey questions can be interpreted as binary which allows them to be tested with a proportion test using the statistic software STATA. To get a result that can be discussed around the first proposition, the first main question (Q1) of both surveys will be proportion tested. This is to see if there is a statistically significant amount of respondents who choose in favor of the first proposition. Similarly, for the second proposition, the second main question (Q2) of both surveys will be proportion tested.

The Control Survey will be similarly analysed to the other surveys, but the basis for comparison is different. Since the Control Survey aims to make sure that the surveys are working as intended, Q1 of the Control Survey is designed to have one superior choice. If this choice is statistically significantly chosen over the other choice, Q1 is working as intended, and as such Q1 of the other surveys should be as well. Q2 of the control question does not have a clearly superior choice. However, it is positioned in such a way that it should render the same response as Q2 of one of the surveys. By comparing these it will be clear if the survey questions are interpreted as intended, and whether the surveys can be assumed to be working correctly.

The results of the study are presented in this chapter. The chapter opens with a description of the respondents to the surveys, followed by the findings from the surveys.

4.1 Descriptions of respondents

The three different surveys were distributed to three different location-based Facebook groups. The surveys were made accessible for a week during which time the surveys got a total of 275 responses. The different surveys will be referred to as Survey 1 (S1), Survey 2 (S2), and Control Survey (CS), respectively, to be able to more easily refer to them. S1 received 104 responses of which 102 were could be of use to the study. S2 received 96 responses with 95 usable. Finally, the CS received 74 valid responses of 75 in total. The criterion on which responses were filtered as unusable was the final control question. By filtering responses to this question the study is sure to only be made on unique survey responses. The demographic information of the respondents can be viewed in Table 4.1 below.

S1 and S2 had a larger representation of females, where CS had an almost equal amount of males and females. This is largely representative of the Swedish Facebook users in 2021 as reported by The Swedish Internet Foundation [Internetstiftelsen, 2022]. It is not as representative of all internet users in Sweden, but since Facebook is used as platform, this is the more interesting metric to compare to. Similarly, the age cohorts are also representative of the Swedish internet user as of 2021 [SCB, 2021]. There is some discrepancy between the different surveys, but some variation are to be expected since the sample was largely random and stemming from different Facebook groups with inherently different demographic differences. The variations in age cohorts coincide with the variations in occupation as well. S1 and CS has a higher amount of respondents in the ages 51-85 than S2, and S1 and CS also have a higher percentage of retirees, which are likely to come from this age cohort. Similarly, S2 and CS has a higher amount of respondents in the cohort 18-35 than S1, and also a higher percentage of respondents who are studying. Taken altogether, the responses to the surveys are a good fit to the Swedish internet users which increases the quality of generalisation of the results.

Table 4.1: Survey demographics

		Survey 1	Survey 2	Control Survey
Gender	Male	39,20%	38,90%	45,90%
	Female	59,80%	58,90%	50%
	Other	0%	1,10%	1,40%
	No answer	1%	1,10%	2,70%
Age	18-34	33,30%	38,90%	40,50%
	35-50	22,50%	27,40%	21,60%
	51-69	33,30%	27,40%	27%
	70-85	9,80%	5,30%	10,90%
	86+	0%	0%	0%
	No answer	1%	1,10%	0%
Occupation	Working	63,70%	65,30%	54,10%
	Studying	11,80%	18,90%	21,60%
	Retired	15,70%	10,50%	16,20%
	Other	8,80%	5,30%	8,10%
Yearly online purchases	1-2	2,90%	0%	10,80%
	3-5	12,70%	9,50%	18,90%
	6-10	19,60%	27,40%	24,30%
	11-20	33,30%	26,30%	27%
	21-50	25,50%	26,30%	14,90%
	50+	5,90%	10,50%	4,10%

4.2 Effects of payment delay

The effect of payment delay is measured with the two questions Q1 and Q2 found on both S1 and S2. Q1 of both surveys is related to the first proposition. That means that Q1 from both studies are needed together to be able to interpret the results to the full extent. Similarly, Q2 of both surveys is related to the second proposition. An example of what the questions of Survey 1 look like can be found in figure 4.1. And how Survey 2 looks can be seen in figure 4.2. The surveys are designed so that each survey will have the others opposite. This means that for the first proposition of the study to be true, the respondents of Q1 of the first survey need to choose alternative 1 and the respondents of the second survey need to choose alternative 2. The same holds true when looking at the results for Q2 for the second proposition.

To be able to compare the responses to each other in an easier way, a help variable is introduced. This help variable is binary and indicates whether the combination of answers to the survey question of both S1 and S2 indicates the same thing. If both surveys get a response that indicates that payment delay affects the choice of last-mile delivery alternative, the help variable is assigned a 1, and otherwise a 0.

Q1	Alternative 1	Alternative 2
Delivery fee:	60 kr	30 kr
Delivery speed:	2-3 days	5-7 days
Delivery method:	Home delivery	Home delivery
Paid in:	30 days	30 days
Product:	Clothes	Clothes
Q2	Alternative 1	Alternative 2
Delivery fee:	60 kr	30 kr
Delivery speed:	2-3 days	5-7 days
Delivery method:	Home delivery	Home delivery
Paid in:	30 days	Immediately
Product:	Laptop	Laptop

Figure 4.1: Illustration of the choices in the questions for Survey 1

4.2.1 Results regarding Proposition 1

The results that are interesting for proposition 1 comes from Question 1 from both Survey 1 and Survey 2. These can be seen in figures 4.1 and 4.2. The distributions of responses from S1 can be seen in Figure 4.3, and the distributions of responses from S2 is presented in Figure 4.4. From looking at these graphs it is clear that the second last-mile delivery alternative holds a majority of the responses. In S1, Alternative

Q1	Alternative 1	Alternative 2
Delivery fee:	60 kr	30 kr
Delivery speed:	2-3 days	5-7 days
Delivery method:	Home delivery	Home delivery
Paid in:	Immediately	Immediately
Product:	Clothes	Clothes
Q2	Alternative 1	Alternative 2
Delivery fee:	30 kr	60 kr
Delivery speed:	2-3 days	5-7 days
Delivery method:	Home delivery	Home delivery
Paid in:	30 days	Immediately
Product:	Printer ink	Printer ink

Figure 4.2: Illustration of the choices in the questions for Survey 2

2 was chosen by 69.6% of the respondents, and in S2 it was chosen by 82.1%. This indicates that the survey questions either did not perform as intended, or that the payment delay had no effect.

If the payment delay had no effect, the respondent is likely to choose the alternative with attributes similar to the most preferred attributes discussed in the literature review in chapter 2. The most important attribute in last-mile delivery according to previous research is the delivery fee. The most prevalent choice in both surveys, Alternative 2, has a lower delivery fee than Alternative 1. In S2 however, there is as mentioned a clear majority of respondents choosing the alternative which implies that delay matters. If this is due to other attributes than the delay of payment is difficult to say.

To further illustrate the responses, the help variable is shown in Figure 4.5. Upon visually inspecting the distribution of the help variable it appears that the payment delay indeed has little effect on the choice of last-mile delivery as only 21.6% of responses are in favor of delay having an effect. To confirm that this is the case, the help variable were tested for statistical significance with a proportion test. If the test shows no significant difference between 50% and the found proportion, payment delay is considered to have a non-random effect on the choice of last-mile delivery alternative.

The proportion test compare the binary help variable with a hypothesised 100% of responses indicating that delay matters. The mean of the proportion of the help variable is 21.56 percent, and the standard deviation is 0.4 percent. The proportion is with a confidence interval of 95% between 0.1356 and 0.2955. The p-value indicates that the hypothesis of 100% of responses saying delay matters, can be rejected.

The proportion test is altered to check for responses indicating high probability

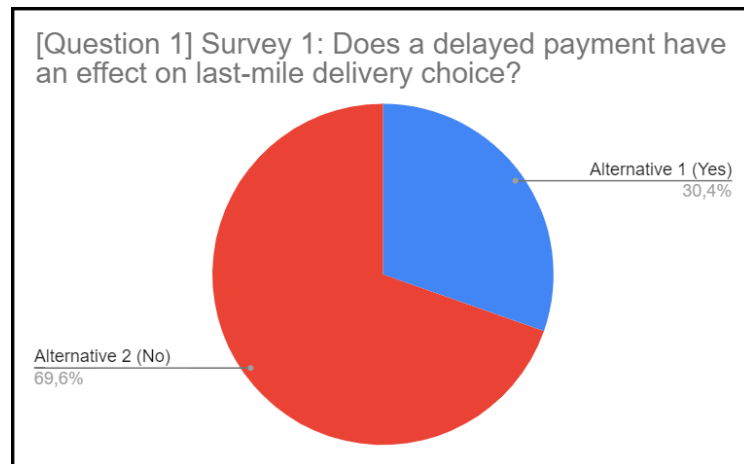


Figure 4.3: Distribution of responses in Survey 1, Question 1

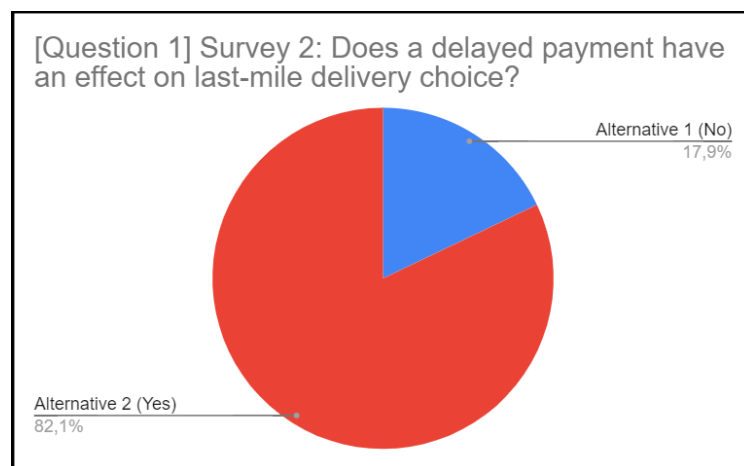


Figure 4.4: Distribution of responses in Survey 2, Question 1

of same last-mile delivery alternative in real life by using the corresponding variable. When delimiting responses to only contain those between 4 and 7 (highest) the amount of responses is 80 out of the total 102 and mean proportion is 21.25 percent which means that the hypothesis is still rejected. The proportion test is further altered with a hypothesised proportion of 50%, but the test still shows a significant difference between the hypothesised and real proportion.

Taken altogether, the proportion testing indicates that the first proposal of the study does not hold up, meaning that there is no evidence of consumers being willing to pay more for a faster delivery if the payment is postponed. Although there was some differences in the proportions of answers between the two surveys, both still showed a overwhelming majority in favor of payment delay not having an effect. This is in line with previous findings only examining delivery fee and speed. This indicates that the factor of payment delay holds little weight in the preferences for last-mile delivery.

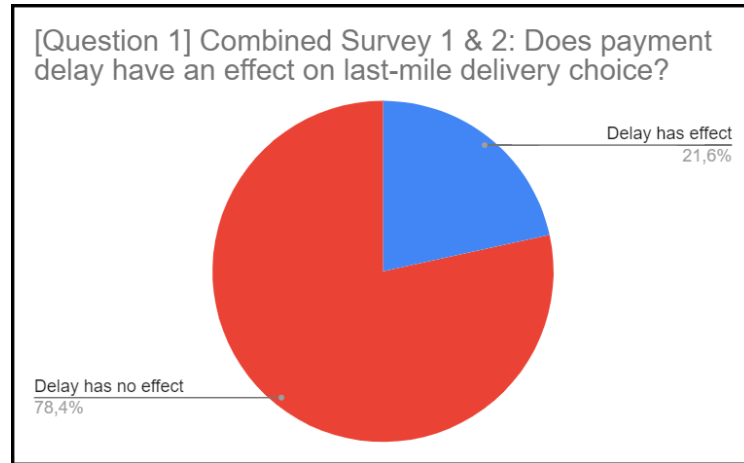


Figure 4.5: The percentage of responses from Question 1 from both surveys that is indicating an effect of payment delay

4.2.2 Results regarding Proposition 2

Moving on to the results for proposition 2, we are now interested in the results from Question 2 from both Survey 1 and Survey 2. Again, these can be seen in figure 4.1 and 4.2. Pie-charts are again used to visualise the distribution of responses. Figure 4.6 shows the split between alternative 1 and 2 from the first survey. This distribution is more even than what we have seen so far. 43.1% prefers alternative 1 and 56.9% prefer alternative 2.

In Figure 4.7 the results from the second survey is presented. This time there is a similar distribution to that of Q1, but with the selection quotas inverted. Here, alternative 1 is chosen by 80%, and alternative 2 by 20%. The second proposition is claiming that respondents would be more likely to choose a more expensive shipping option when purchasing a cheaper product, if the payment is immediate, rather than delayed with 30 days. In other words, the proposition is stating that a cheaper product with a low delivery fee, fast delivery, but a future payment date will be the least preferred option. The proposed least preferred option correlates to alternative 1 from the second survey, and the proposed most preferred option correlates to alternative 2 from the second survey.

While the proposition does not explicitly say anything about a more expensive product, it is assumed to behave in opposite to the cheap product since the survey questions are designed to be opposites on each survey. This means that the least preferred option for the expensive product would be a low fee, immediate pay, and slow delivery. This correlates to alternative 2 from the first survey. The most preferred would be the higher fee, faster delivery, and delayed pay. This correlates to alternative 1 from the first survey.

Interpreting the results from Survey 1, Question 2, the purchase of an expensive product, it shows that a slim majority of respondents prefer the more expensive and faster delivery option with a delayed payment. This contradicts findings for the first proposition where the majority of responses indicated that a low delivery fee always is the most important attribute. In this case, respondents are choosing the higher delivery fee and postponing the purchase which indicates that the payment delay has

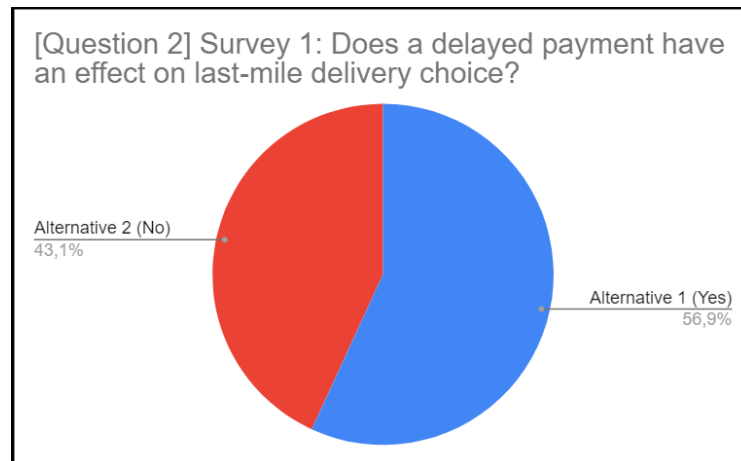


Figure 4.6: Distribution of responses in Survey 1, Question 2

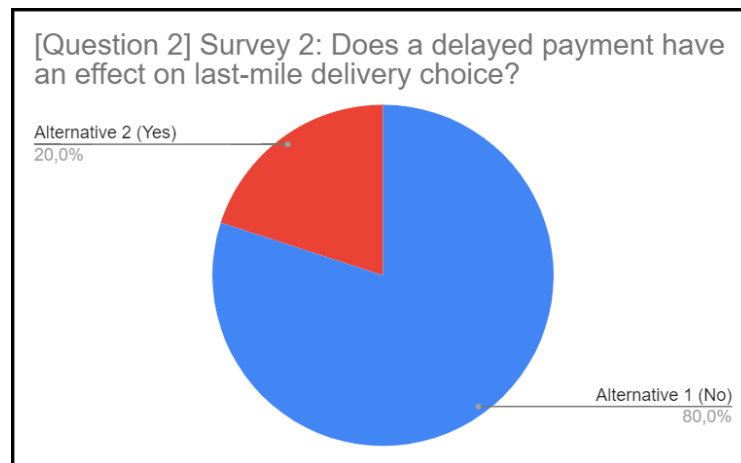


Figure 4.7: Distribution of responses in Survey 2, Question 2

an effect.

The results from Survey 2, Question 2 shows that the vast majority of respondents prefer alternative 1, the last-mile delivery choice where the delivery fee is low, delivery speed is fast, and payment is delayed with 30 days. This is in direct contradiction to the proposition. The found results indicate that there is no effect of the payment delay.

To further illustrate this, the results from Question 2 of both Survey 1 and Survey 2 have been compounded in a similar way as for Question 1. A help variable was again created to show when both surveys received responses that showed payment delay having an effect of the preferred last-mile delivery alternative. The illustration of the help variable can be seen in Figure 4.8. Similarly to before, the majority of the responses indicate that payment delay has no effect. 85.3% of responses indicate no effect, and 14.7% indicate that there is an effect. Like with before, this is confirmed with a proportion test.

Again, the responses indicating that delay matters are tested against a hypothesised 100% to see whether the found result is significantly different from 100 percent. In this test, the mean of the help variable is 14.7 percent and has a standard devi-

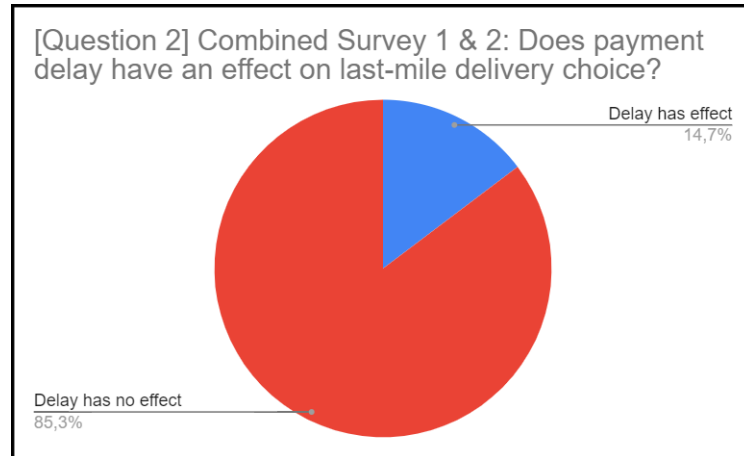


Figure 4.8: The percentage of responses from Question 2 from both surveys that is indicating an effect of payment delay

ation of 0.4 percent. The confidence interval for the help variable is between 0.08 and 0.216. The p-value here confirms the suspicion that the hypothesis of 100% of responses saying that delay matters can be rejected.

As in the previously performed proportion test, the test is repeated, this time only using the responses that indicate high probability of making the same choice in a real scenario. This reduces the amount of tested responses from 102 to 78, but the conclusion remain the same. From testing only these responses, the mean of the help variable decreased, indicating that the respondents most sure of their answers are not affected by payment delay. Again, testing for 50% of the respondents in the same proportion test yields similar results to the others, still showing no effect of payment delay.

Having tested the claims in the proposition with proportion tests it can be concluded that the proposition is faulty. This means that there is no statistical significance of respondents who prefer a more expensive, immediately paid, faster delivery when buying a cheaper good.

4.2.3 Results from the Control Survey

Moving on to the results from the Control Survey, we again have two questions. These questions were put together differently from the other questions from the two main surveys. The Control Survey questions were designed to test the reliability of the other responses. If the responses to the Control Survey conform with established theory and predicted outcome it can be concluded that the surveys have performed as intended.

Question 1 of the Control Survey is similar to Question 1 of Survey 2. The choices for Question 1 are shown in figure 4.9. The two choice alternatives differ in their delivery fee, delivery speed, and payment delay. In this question, the payment delay is made to have very little difference, in this case, one day. This would allow the other attributes to take precedence over the choice since there is little real difference in the attribute of payment delay. In such a case where the payment delay is of no importance, the expected result would that described by previous literature laid out

in chapter 2. This would mean that the expected result here is that the majority of responses prefers alternative 2, since it has the lowest delivery fee.

	Alternative 1	Alternative 2
Delivery fee:	60 kr	30 kr
Delivery speed:	2-3 days	5-7 days
Delivery method:	Home delivery	Home delivery
Paid in:	30 days	29 days
Product:	Clothes	Clothes

Figure 4.9: Depiction of choices in Question 1 of the Control Survey

The results from Question 1 of the Control Survey can be seen in figure 4.10 below. Of the respondents, 17.6% chose alternative 1, and 82.4% chose alternative 2. As predicted, a majority of the respondents chose alternative 2 which is in accordance to the established theory. From this it can be concluded that the respondents have interpreted the surveys correctly. Knowing this gives strength to the findings of the other surveys, indicating that their responses were made with understanding of the questions and their attributes. Of the 74 responses to the Control Survey, 58, or 78.4% indicated with the highest likelihood the respondents would choose the same choice in a real life scenario, which further increases the quality of the responses. The responses that indicated a higher likelihood than not for making the same choice in real life amounted to a total of 96%.

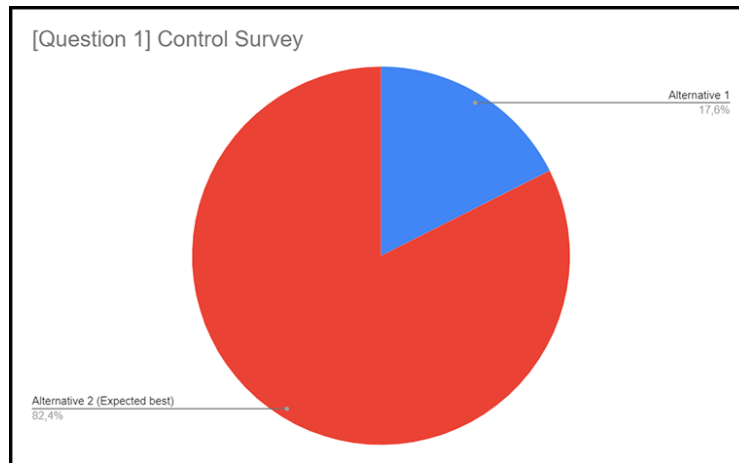


Figure 4.10: Distribution of responses to Question 1 of the Control Survey

Question 2 of the Control Survey does, like Question 1, compare to previous literature. Question 2 of the Control Survey is similar to Question 2 of Survey 1 but has a key difference in the payment delay. The choice alternatives of Q2 of the Control Survey can be seen in figure 4.11. The two alternatives differ in delivery fee, delivery speed, and payment delay. The difference in payment delay here is minimal where alternative 1 has a payment delay of one day, and alternative 2 has no delay.

Again, it is expected that the majority of the survey respondents choose alternative 2 because it has the lower delivery fee.

	Alternative 1	Alternative 2
Delivery fee:	60 kr	30 kr
Delivery speed:	2-3 days	5-7 days
Delivery method:	Home delivery	Home delivery
Paid in:	1 day	Immediately
Product:	Laptop	Laptop

Figure 4.11: Depiction of choices in Question 2 of the Control Survey

Of the 74 respondents, 27% chose alternative 1, and 73% chose alternative 2. The distribution can be seen in figure 4.12. The majority of the respondents chose in accordance to the previous literature, but with a wider spread than for Question 1. A similar behavior to that of Question 2 of Survey 1. The conclusion from this is again that the survey was understood correctly. Regarding the likelihood of making the same choice in a real scenario, the results are similar to Question 1. 75.7% of respondents indicated the highest likelihood of making the same choice in real life, and the total percentage of those who had higher likelihood than lower amounts to 97.4%. This is higher than the result for Question 1, and reinforces that the responses are reliable.

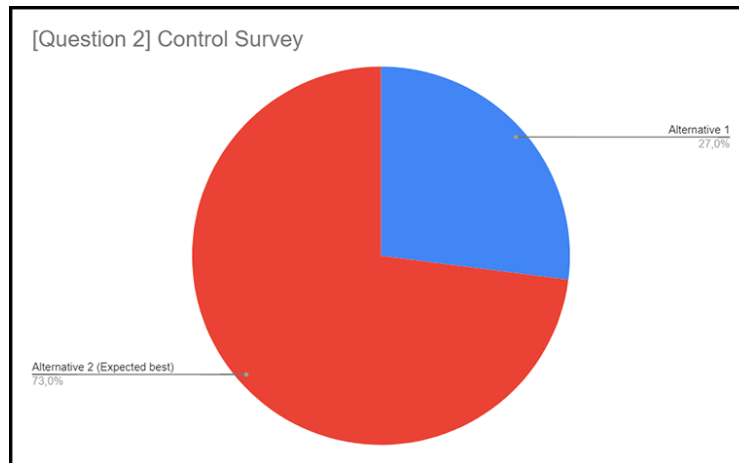


Figure 4.12: Distribution of responses to CS Q2

This chapter discusses the results from the surveys as well as analyzing possible reasons for the outcome of the surveys.

5.1 The insignificance of payment delay

While the surveys in this study all are different, they have one thing in common. They all seem to indicate that payment delays have little to no effect on consumer's choice of last-mile delivery. Whether the purchased product is a an expensive laptop, clothes, or cheap printer ink, the key deciding factor seems to always be the delivery fee. Aside from the Control Survey, where the questions were designed for delivery fee to be the most important attribute, the cheapest delivery option was consistently chosen for 3 of the 4 total questions of the other surveys.

5.1.1 The one occurrence conforming to present bias

The theory on which the propositions of the studies were hinged suggested that present bias and the discounting of losses would have consumers especially prefer situations where a faster delivery which cost more, were paid in the future. The only question which had an answer in somewhat support of this was Q2 of the first survey. In this question, respondents indicated that they were willing to pay for a more expensive, but faster delivery, with a later pay-date. Here, 56.9% chose this alternative, and 43.1% the alternative with lowest delivery fee. The product in consideration were a laptop. In all other questions, with different products, all respondents preferred the option with the lowest fee. That it was the option with a laptop that gave this particular result could potentially be explained with the theory that people are prone to delay big losses, and that present bias has a bigger effect on expensive products [Hardisty et al., 2013]. With this in mind, a laptop would naturally be discounted more than printer ink or clothes, and as a laptop likely is a bigger investment than the other two mentioned products, postponing its payment seems likely as well. Furthermore, one similar finding has been made in one previous study on consumer preferences for last-mile delivery.

That only one other study showed this behavior can be explained with the different levels of products, as well as the type of product. In the study by Filipsson and Gustafsson (2021), the products were vacuum cleaners, and bags for vacuum cleaners. Here, there is a significant price difference between the products. However, a consumer may be less involved in the purchase of a vacuum cleaner than a laptop,

giving rise to the missing phenomenon of greater inclination of choosing the more expensive, but faster shipping option. Because Filipsson and Gustafsson (2021) do not study the difference in payment delay, this is hard to compare. The study of Milioti et al. (2019) only looked at different groceries as product type where there is little personal involvement of the purchase aside from the preference for grocery. The only study where this finding were made was the one by Gawor and Hoberg (2018). Their study only considers more expensive, high involvement goods. While delivery fee again is the most important attribute, the study finds that delivery speed becomes increasingly more important for more expensive products. The study specifically states that consumers who prefer the cheapest delivery option for cheap products can favor a faster delivery over a lower fee for a more expensive product.

5.1.2 Differing proportions of preferences

While it was established that there is no significant relationship between payment delay and consumer choice of last-mile delivery, the responses were not completely unanimous. When comparing Question 1 of both Survey 1 and Survey 2, both are strongly in favor of delay having no effect on the choice. However, there is a difference in the proportions of these answers. In S1, where product is clothes, and payment delay is 30 days, 30.4% of the responses chose the more expensive, faster shipping. In S2, in which there were no payment delay, considering the same product, only 17.9% chose the option with more expensive and faster shipping. There is a difference of 12.5 percentage points here. While it is not statistically significant, it is still saying something.

Although the method design of this study makes it hard to pinpoint which exact attributes weigh the heaviest in these surveys, the result can still be discussed. One argument for the choice with the faster delivery could be that the consumer is eager to try their clothes, or that they are bought for a special occasion. However, if this was the case, then the alternatives of both surveys should have more similar proportions. When this is removed from the equation, the key differentiating factor is the payment delay.

An explanation for why the alternative with a delay of 30 days is chosen more than its counterpart without delay could be that the consumer simply choose to accept the higher cost of shipping when the payment is postponed. In the circumstances of buying clothes, a shipping cost increase from 30 to 60 SEK could be considered negligible when payment is postponed. This has some similarities to preference reversal [Ainslie and Haslam, 1992, Mazur, 1987, Seinstra et al., 2018] where the consumer usually prefer the cheaper delivery fee, but under these circumstances instead prefer the more expensive one. In this case the reversal would happen because the payment is postponed, since the survey with no payment delay do not express this to the same degree.

5.1.3 The magnitude effect does not apply

The second proposition examined if the loss of paying for a low cost good at a later date would impact the choice of last-mile delivery alternative. In Q2 of S2, the alternatives are for the low price product of printer ink. The proposition predicted

that the alternative with immediate pay, although more expensive fee, would be the more popular choice. This was not the case, and again the responses were in favor of the alternative with lowest delivery fee, despite the payment being 30 days in the future.

The reasoning behind this proposition lies in the magnitude effect [Thaler, 1981, Baker et al., 2003, Benhabib et al., 2010] which states that a smaller loss could be conceived as larger than it is if it is put off in the future. With this reasoning, the expected outcome for the second proposition was that the majority of respondents would refrain from choosing the option with a cheap product, lower fee, and payment in the future. Instead, the respondents were thought to choose the option with a higher fee, but immediate pay so as to counteract the magnitude effect. Seeing as this was not the case, as well as the confirmation that the surveys worked as intended from the Control Survey, the conclusion is that consumers do not consider paying for a product as a loss in the same manner as simply losing money, or an unexpected expense. Taking this into account, the responses to the survey is perfectly in line with previous studies that state delivery fee as the most important attribute of last-mile delivery.

5.1.4 Practical implications

In broad strokes, the results from this study tells us that payment delay has little to no effect on which last-mile delivery alternative a consumer prefer. The practical implications of this is that businesses who supply invoice services and credit to consumers can extend their payment horizons without change in consumer behaviour. The most important thing for consumers is that the delivery fee is low, and that they get the product. When the payment is due holds less importance. This is in line with reports of companies working with these sort of payment systems increasing in popularity [Horowitz-Ghazi, 2022]. This in turn has consequences for etailers who are inclined to partner with these payment processors. While it is good to offer variety when it comes to payment, these payment handlers are often multi-sided platforms, subsidised by the etailers. The fact that consumers don't mind payment delay comes with the added benefit of receiving the product before paying for it as well. This enables the consumer to test the product, or discover shortcomings. This makes it easier for the consumer to return the product without ever having to worry about getting money back since nothing was paid.

5.2 The study design

The design of the study serves the purpose of intently testing regular last-mile delivery scenarios with and without payment delay. Because of this, it is structured as an experiment study where different experiment groups are given different surveys with different questions. The study is however lacking in the sense that it is hard to analyze the results with precision. Because the study utilizes few questions with few possible responses, there is little granularity to be had. The study becomes limited in its testing capabilities because there is no quantitative data to run the tests on. An alternative study design would have been a conjoint study as many studies

before this one have been, as seen in Appendix 1, table 7.1. However, in an effort to differentiate from previous studies this was decided against. Furthermore, much of the previous literature is congruent on which attributes are the most important in last-mile delivery, which makes a different study design fitting, to see the problem from a different perspective.

Another benefit of the current study design is that it is brief and easy to comprehend, yielding many responses. A more complicated study would have been interesting to analyze, but would also have taken considerably more time and effort to conduct [Horowitz-Ghazi, 2022]. If the study was reworked, bigger emphasis should be put on getting numerical values for consumers involvement in their purchase, as well as rankings of each of the last-mile delivery attributes. This way, a broader range of statistical tests would be viable, and could enable more interesting analyses. Different conclusions could potentially be reached with a larger set of last-mile delivery attributes. The chosen ones for this study may behave in a way that other combinations may not have. Similarly, a study with different proposed products may also have performed differently, yielding different results and therefore also a different conclusion. Finally, surveying a larger population would allow for a greater and more realistic generalization of the findings.

Chapter 6

Conclusions and Future Work

This chapter concludes the study and highlights areas for future research. Limitations of the current study is also discussed, followed by the final conclusion of the study.

6.1 Limitations

This study is particularly limited by its narrow scope of geographical location and subset of last-mile delivery alternatives. The study would have benefited from being able to study a larger population, be it in Sweden or a larger geographical area. It would strengthen the ability of generalization of the results tremendously. Furthermore, this study is as mentioned limited by its choice of attributes for last-mile delivery. The broader picture can be captured when a wider set of attributes are utilized in the study. The current study only focuses on home delivery, whereas in reality, more and more are starting to use self-service parcel lockers, drone deliveries, and traditional deliveries to pick-up points as seen in 7.1. As mentioned before however, more options would also potentially result in the survey being harder to answer, and yield less responses [Ghuri et al., 2020, Alriksson and Öberg, 2008].

Another point where this study has a weakness is in its study design. This study is a stated preference study, and while they are easy to conduct, a revealed preference study would produce a more reliable and valid result. Although, conducting a similar study as a revealed preference study would be difficult, it could be attempted in other ways, such as a qualitative study to get another view of the problem area, and deepen the knowledge overall, instead of trying to measure hard values. Another weakness is in the products the study is based on. The products are well known so that many respondents can relate to buying them. However, a broader selection could yield a more nuanced result. The current selection of products also have no value attributed to them. This can be seen both as a limitation and as something positive. It enables respondents to answer with feelings rather than thinking too much on the actual value. At the same time, two respondents may have completely different ideas of how much value they attribute to the same product.

6.2 Future Research

Despite this study's greatest efforts, this field remains vastly unexplored. Delays of not only payments but also deliveries could be studied to a greater extent in the future. Interesting areas to study could be if different products are affected

differently from having a delayed payment. There is room to examine the effects for broader product categories here, as well as different urgency of the products similar to how Milioti et al. (2019) did when researching last-mile delivery for groceries. There is also the possibility to examine what degree of delay there is. There could be a difference between delaying for 30 days and 90 days which this study did not examine at all. Furthermore, future studies could also study the effects of different terms for payment, such as part-payments, interest rates, and payment fees and how that correlates to different types of products. As seen in this study, a purchase of a laptop yielded a greater proportion of responses for the alternative with more expensive delivery, but delayed payment. This could be examined further to see whether there are any interaction effects for when or if payment delay had an effect and at what levels it takes effect.

As previously mentioned, this study is solely focusing on home delivery. There may be discoveries to be made with other delivery methods as well. Future studies in this field could be compared to the current one as well, since this study has had a hard time comparing to previous studies, seeing as there are none with this particular niche.

6.3 Conclusion

The purpose of this study was to broaden the field of consumer preferences in last-mile delivery. This was intended to be done with the inclusion of payment delay as an attribute in last-mile delivery scenarios. As this study comes to a conclusion, its purpose has been fulfilled, and the goal has been achieved. This study investigates how consumer preferences for last-mile delivery is affected by payment delay. This is a new addition to the field of consumer preference studies in relation to last-mile delivery, on which this study firmly stands. This study also incorporates different uses of time preference theory to build and test its propositions.

As e-commerce continues to grow fast and steadily, so does the need for last-mile delivery. The studies in this field has added great knowledge to how consumers act when shopping online. Preferences for last-mile delivery has been studied extensively. Delivery fee and delivery speed are the two top contenders for most important attribute when choosing last-mile delivery alternative. These studies have been made with regards to different research methods, product types, consumer groups, and research populations. This study's addition to the field is that of the time preference theory, and how time preference impacts the last-mile delivery decision. While it is known that a faster delivery is preferred, that is the length of what the current research until this study could confirm. With an experiment study incorporating two experiment groups with accompanying experiment surveys, and one control group, this study tries to discuss the propositions based in previous research and theories. The propositions asks if consumers are willing to choose a more expensive shipping alternative if payment is delayed, and if consumers are willing to choose a more expensive shipping alternative if the product is of low cost, and the payment is delayed.

The results of this study shows that the impacts of payment delay on consumer preference for last-mile delivery is minimal. There is no statistical significant relationship between payment delay and choice of last-mile delivery alternative. The

key driving factor of preference for last-mile delivery is, in accordance to previous literature, the delivery fee.

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Source	Method	Product types	Last-mile delivery attributes	Consumer types	Context
Buldeo Rai et al., 2018	Choice based conjoint experiment	Not specified	Delivery fee Delivery speed Delivery method Return possibility	Not studied	Exploring how consumers are willing to choose more environmentally friendly last-mile delivery options
Nguyen et al., 2019	Choice based conjoint experiment	Convenience goods (groceries) Shopping goods (clothes) Speciality goods (electronics)	Delivery fee Delivery speed Delivery time slot Daytime/evening delivery	Price oriented consumers Convenience oriented consumers Value oriented consumers	Studying consumers preferences in last-mile delivery attributes using mental accounting theory
Merkert et al., 2021	Choice based conjoint experiment	Not specified	Delivery fee Delivery speed Delivery method Delivery time slot	Not studied	Studying preference differences between postman- and drone delivery in Australia
Goebel, 2012	Empirical analysis	Not specified	Delivery time slot	Always available Sometimes available Not available	Studying willingness to pay for convenience across different availabilities of consumers
Milioti et al., 2020	Ranking experiment	Weekly groceries Urgent groceries	Delivery fee Delivery method Delivery time slot	Price conscious consumer Consumers under time pressure	Studying consumer preferences of grocery delivery in UK and Greece
Gawor and Hoberg, 2018	Choice based conjoint analysis	Smartphone Digital camera Laptop	Total price (product+delivery fee) Delivery method Delivery speed	Budgeter Lead time shopper Convenience shopper Balanced buyer	Studying trade-offs between different last-mile delivery attributes
Filipsson and Gustafsson, 2021	Choice based conjoint analysis	Low involvement good High involvement good	Delivery fee Delivery speed Delivery method Tank-to-wheel emissions	Grouped by income Grouped by gender Grouped by age Grouped by online purchase habits	Studying preferences for green last-mile delivery
Ignat and Chankov, 2020	Stated preference survey	Not specified	Delivery fee Delivery speed Delivery method Delivery emissions Carrier benefits	Not studied	Studying changes in preferences in last-mile delivery when consumers are presented with additional information on environmental and social sustainability
Garver, 2012	Adaptive choice modeling	Textbook	Transportation company Delivery speed Delivery guarantee Delivery tracking Delivery insurance Delivery fee	Not studied	Studying consumer satisfaction and retention in eetailing with regards to last-mile delivery

Table 7.1: Literature review summary

Name	Dustin				
Delivery method	Postal agent	Home delivery			
Delivery fee (kr)	0	199			
Delivery speed	1-2 days	1-2 days			
Payment options	30 days	Immediately			
Name	Boozt				
Delivery method	Parcel locker locker	Postal agent	Home delivery		
Delivery fee (kr)	0	29	39		
Delivery speed	1-2 days	1-2 days	1-3 days		
Payment options	30 days	Immediately			
Name	Apotea				
Delivery method	Parcel locker locker	Postal agent	Home delivery		
Delivery fee (kr)	0	0	39/0		
Delivery speed	-	-	-		
Payment options	30 dag	Immediately			
Name	Tingstad				
Delivery method	Postal agent				
Delivery fee (kr)	99				
Delivery speed	1-3 days				
Payment options	Immediately				
Name	Adlibris				
Delivery method	Home delivery	Parcel locker locker	Postal agent	Letter	
Delivery fee (kr)	39	39	45	29	
Delivery speed	1-7 days	1-14 days			

Payment options	30 days	14 days	Immediately		
Name	Bygghemma				
Delivery method	Home delivery				
Delivery fee (kr)	49				
Delivery speed	8-10 weeks				
Payment options	14 days	Immediately			
Name	Nelly				
Delivery method	Parcel locker locker	Home delivery	Letter	Letter speedy	Parcel locker speedy
Delivery fee (kr)	29	59	0	29	49
Delivery speed	3-5 days	1-2 days days			
Payment options	14 days	Immediately			
Name	Mathem				
Delivery method	Home delivery				
Delivery fee (kr)	0				
Delivery speed	3 days				
Payment options	30 days	Immediately			
Name	Jollyroom				
Delivery method	Postal agent	Home delivery	Pallet		
Delivery fee (kr)	0	99	299		
Delivery speed	2-4 days				
Payment options	30 days	Immediately			
Name	NAKD				
Delivery method	Parcel locker	Postal agent			

Delivery fee (kr)	0/39	39			
Delivery speed	1-3 days				
Payment options	30 days	Immediately			
Name	24mx				
Delivery method	Postal agent	Home delivery	Express home delivery		
Delivery fee (kr)	99	199	199		
Delivery speed	-	-	-		
Payment options	30 days	Immediately			
Name	Komplett				
Delivery method	Home delivery	Postal agent	Parcel locker		
Delivery fee (kr)	29/99	0	0		
Delivery speed	1-3 days				
Payment options	Immediately	30 days	2 months	6 months	
Name	CDON				
Delivery method	Letter	Postal agent			
Delivery fee (kr)	0	0			
Delivery speed	-	-	-		
Payment options	Immediately	14 days			
Name	Inet				
Delivery method	Postal agent	Home delivery			
Delivery fee (kr)	0/29	29			
Delivery speed	1-2 days				
Payment options	Immediately	14 days			

Name	Ellos				
Delivery method	Postal agent	Express postal agent	Express home delivery	Home delivery postnord	
Delivery fee (kr)	49	69	79	95	
Delivery speed	2-4 days				
Payment options	Immediately	30 days			
Name	Footway				
Delivery method	Postal agent	Parcel locker	Home delivery		
Delivery fee (kr)	29	39	79		
Delivery speed	1-2 days				
Payment options	Immediately	14 days			
Name	Mediamarkt				
Delivery method	Letter/Postal agent	Express home delivery			
Delivery fee (kr)	0	99			
Delivery speed	1-6 days				
Payment options	Immediately	14 days			
Name	Lyko				
Delivery method	Parcel locker	Parcel locker express	Home delivery	Economy delivery	
Delivery fee (kr)	19	49	39	0	
Delivery speed	1-4 days				
Payment options	Immediately	14 days			
Name	Royaldesign				
Delivery method	Postal agent	Parcel locker	Letter	Home delivery	
Delivery fee (kr)	39/49	39/49	49	39/99	
Delivery speed	1-4 days				

Payment options	Immediately	14 days			
Name	Babyshop				
Delivery method	Postal agent	Home delivery			
Delivery fee (kr)	59	99			
Delivery speed	1-2 days	1-3 days	2-5 days		
Payment options	Immediately	14 days			
Name	Gymgrossisten				
Delivery method	Parcel locker	Letter	Postal agent	Home delivery	
Delivery fee (kr)	29/39	29	34	39/89	
Delivery speed	1-3 days				
Payment options	Immediately	30 days			
Name	Outnorth				
Delivery method	Letter/Postal agent	Home delivery			
Delivery fee (kr)	49	129			
Delivery speed	1-3 days				
Payment options	Immediately	30 days			
Name	Scandinavianphoto				
Delivery method	Postal agent express	Postal agent/Letter	Home delivery		
Delivery fee (kr)	79	0	199		
Delivery speed	1-2 days	3-4 days			
Payment options	Immediately	30 days			
Name	Lensway				
Delivery method	Letter/Postal agent				

Delivery fee (kr)	49				
Delivery speed	1-2 days	1-10 days	5-7 days		
Payment options	Immediately	30 days			
Name	Idealofsweden				
Delivery method	Postal agent	Letter	Parcel locker	Home delivery	
Delivery fee (kr)	49	29	29	49	
Delivery speed	2-4 days				
Payment options	Immediately	30 days			

Table 7.2: Aggregate shopping and delivery information
from Sweden's 25 biggest etailers

