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The influence of the risk of missing out on intertemporal choices regarding online shopping among students in The Netherlands

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Since online shopping has become more prevalent over the last few years, it is an interesting field to research. This research assesses the impact that risk has on intertemporal choices regarding online shopping. It is specifically focused on the difference in behavior regarding convenience goods and shopping goods. An experiment has been run in which a sample of 94 people has answered questions regarding their shopping behavior. To the dataset that has been gathered from this experiment statistical analyses have been applied. Evidence has been found that suggests a positive association between the exposure to risk and the height of the discount needed to persuade people to delay purchasing goods. This research was done during the Covid-19 pandemic, during which time people were even more accustomed to shopping online, compared to shopping at a regular store.

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Introduction

People make important decisions every day. From choosing how long to study to deciding whether or not to buy those new shoes. A lot of these choices involve risk and impact the future. Over the past years we have seen a growing part of shopping done online. During the covid-19 pandemic we have seen that this transition has happened even faster. The possibilities to purchase products without having to leave the couch have become almost unlimited. Ordering a new pair of jeans online and having it delivered to your door the next day seems to have become normal. Since starting this research multiple companies have started delivering groceries to your door within 15 minutes after ordering them on their mobile application. This rapid development of online platforms to deliver any product to you leads to interesting questions about the behavior of consumers regarding these services.

Since more people have adopted online shopping, this research will try to understand how people react to the risk of missing out when faced with an intertemporal choice. Alongside this main objective the difference in the behavior regarding convenience goods and shopping goods will be assessed. To assess this the main research question will be: "*What is the effect of risk on the intertemporal choices regarding online shopping among students in The Netherlands?"*

This research will contribute to the existing literature by incorporating components that have not been combined previously. Although risk and intertemporal choices have been the focus of previous research, this has mainly been assessed by choosing between two hypothetical given outcomes with a given monetary gain or loss. This research asks participants to make a purchasing decision with these elements incorporated. Furthermore, it will regard two different types of goods. This can be interesting for online retailers, since understanding the behavior of consumers is key in adopting the best business strategy.

For this research an experiment will be run in which students in The Netherlands have been asked to answer an online questionnaire. Here they will be asked to imagine they are shopping for a new coat and for some shampoo. There will be the option to purchase the product right now, or at a later point in time. For the time they have to wait, participants will be compensated with a given discount. Approximately half of the participants will be told about the risk they could miss out on the product if they wait to get a discount, the other half will be told there is no risk of missing out on the ability to purchase the product at the later date. After this, statistical analysis will be used to analyze the behavior for both products.

Theoretical framework

So many choices during the day are intertemporal choices regarding some sort of risk, even if people do not realize this when a decision is made. This makes it interesting to study and to assess the behavior of people when faced with intertemporal choices in which risk is involved. This section is divided into two parts. In the first part some key concepts relevant to this topic will be explained, after which prior research in this field and the hypotheses for this research will be discussed.

Intertemporal choice

An important aspect in the individual decision making of people is time. Should you purchase that new road-bike right now, or is it better to save your money? This depends on the utility one derives from the new bike, compared to that of saving the money and buying it at a later point in time. There is always a trade-off between now and the future. Often people can benefit from delaying consumption. By postponing a purchase people can receive interest on their savings and the goods that people want to buy could become cheaper. These choices are called intertemporal choices. In economics people are expected to behave rationally. As Loewenstein and Thaler (1989) have stated, this assumption often does not hold for intertemporal choice.

Risk (Uncertainty)

Most of the choices we make involve some sort of risk or uncertainty. Should I bring an umbrella with me today? Should I buy that new MacBook right now, or wait for it to go on sale? In both scenarios you are uncertain what the best option will be. When you invest in something there is a chance that the actual returns are different to the returns that one would have expected. You do not want to invest the effort of bringing an umbrella if it does not rain and you might not want to invest money in a new laptop if it goes on sale soon after. In this research we assess the risk of missing out on the opportunity of buying a certain product. Therefore, the risk of missing out has to be incorporated in the expected utility of the decision maker.

Different goods

Two types of goods will be assessed in this paper. The types are convenience goods and shopping goods. In a paper published by Richard H. Holton in 1958 a definition was given for both types of goods. Convenience goods are goods that are consumed regularly and are bought without a lot of thought. These goods are relatively comparable between different brands in both price and quality. In this paper shampoo will be used as the convenience good. Shopping goods are goods that require

more thought and planning before buying. These products are more expensive and have a longer lifespan compared to convenience goods. There is a larger difference in price and quality between different brands. In this paper a new coat will be used as the shopping good. In his paper, Holton has stated that products can be shopping goods to some people and convenience goods to others. This can be due to a difference in interests or socio-economic status.

Earlier theories regarding Intertemporal choices and risk

The literature regarding experimental studies that focus on the effect of risk on intertemporal choices is somewhat limited. Most of the experiments that have been run are focused on fictional choices regarding monetary gain or loss. Furthermore, most experiments also use a given amount of risk, which is often not the case in real life situations. Keren and Roelofsma (1995) have studied how risk affects intertemporal choices regarding hypothetical monetary gains. People had to choose between receiving money at a certain moment or receiving some more 4 weeks later. For two time periods, three levels of risk have been evaluated. It indicates that for choices in the near future, the addition of risk makes people more likely to choose the later outcome, whereas in the remote future, there is no significant effect. From previous research we can derive that for most people the exposure to risk influences their behavior regarding intertemporal choices. As Anderson and Stafford (2009) have found in their study regarding the influence of risk on individual decision making, people become less patient as their exposure to risk is increased. From previous research we can also derive that people behave differently regarding different types of goods. Dommermuth (1965) found that people are more conscious when spending their money on shopping goods compared to convenience goods and that they perceive risk differently. These previous findings lead to the following hypotheses:

When purchasing shopping goods online, being exposed to the risk of missing out leads people to purchase a product now, rather than waiting for it to go on sale.

When purchasing convenience goods online, being exposed to the risk of missing out leads people to purchase a product now, rather than waiting for it to go on sale.

It is important to state that during this research the market interest rate for personal savings accounts was around 0%. This indicates that a potential to gain interest on a savings account should not impact the behavior of the participants in this research.

Data

In this section the data that has been gathered for this research will be discussed. To find an answer to the research question an experiment has been run in which people have been asked to answer an online survey. First the survey that has been conducted will be explained after which the gathered sample will be described. Finally, the relevant variables gathered from the questionnaire will be described.

Experimental design

The questionnaire will consist of four phases. First, all the participants are randomly assigned to either the group in which risk is involved or the group in which risk is not involved. For this experiment, the risk has been defined as the possibility of a product being out of stock, when a purchase is delayed. Since the participants are randomly assigned, a significant difference in the purchasing behavior can be assigned to the effectiveness of the treatment. The quality of this randomization was checked by comparing the later collected background and control information between the two treatment groups. Second, respondents are briefly informed about the benefit of delaying a purchase and are informed whether risk is involved or not. In both cases it is clearly stated whether risk is involved to ensure that there will be no misunderstanding about this. The information regarding risk is the "treatment" in this survey. Third, participants are asked to answer questions regarding their purchasing preferences regarding two types of goods at different discount rates. The respondents have to imagine they are shopping online for some goods they want to buy. The first type is shopping goods, for this the example used is a new coat costing €200,-. The second type is convenience goods, for this the example used is a bottle of shampoo costing €5,-. For both products there are four discount rates for which participants have to make a decision. These are 20%, 30%, 40% and 50%. Finally, respondents answer some control questions which might influence the results in case of inequalities between the groups. A complete overview of the survey is added in the appendix.

Survey type

The purpose of the current study was to assess whether, on average, the risk of a product being out of stock, influences shopping behavior. Therefore, the primary interest was to detect between-subject differences. However, since multiple questions which are nearly identical with the only varying component being the discount rate, participants may have a certain degree of consistency throughout the survey, which yields the potential for anchoring which would influence the results. Furthermore, asking nearly the same questions with only the risk factor changing could lead to order

effects which could also impact the findings. Therefore, in the analyses we will account for within-subject dependencies to accommodate the between-subject design to evaluate the risk component.

For the evaluation of the difference between the goods the primary interest was similarly to detect between-subject differences because the aim was to detect the average influence of the risk of a product running out of stock influenced the decision to buy a product now or in six months at separate discount rates. The design of the questions helps to prevent participants from being anchored to a specific discount rate. This is because they have to choose for each discount rate instead of choosing a specific discount rate themselves.

Survey sample

The sample that completed the survey consists of 94 respondents. The survey was mainly targeted at students with an age ranging from 18 to 25 years old. Most of the respondents indeed are students in this age group, but the other participants have also been kept in the sample, therefore the age and occupation of participants have been used to control the randomization.

Data type and relevant variables

In this survey only quantitative data has been used. This design has been chosen because this can be used for statistical analyses. For each participant eight purchasing decisions are registered along with various control questions and a dummy variable to determine whether risk was involved in their survey. The risk has deliberately not been quantified, this because in a real life scenario you don't know how big the risk of losing out is. Quantifying the amount of risk could also encourage participants to make a mathematical decision rather than an instinctual decision. Each purchasing decision consists of three elements. The first is the product that the participant will buy, being a coat or a bottle of shampoo. The second is the discount rate, which is 20%, 30%, 40% or 50%. The third element is the choice whether to buy the product now or in six months' time. This generates a dataset in which for each participant the decision to purchase a product is registered for each discount rate for both products. The data from the purchasing decisions will be transformed differently for both hypotheses in this thesis. How this transformation is done will be discussed in the methodology. These purchasing decisions are the main variables of interest on which the answers to the research question will be based. Control variables included in this study were age, sex and employment status. Age was categorized as 18-25, 26-35, 36-45, 46-55 and 56+, sex as female, male, non-binary/third gender or prefer not to say, and employment status as student, employee and self-employed.

Methodology

In this section, the methods used in this research will be discussed. In the first part of this section, the program used for the analyses will be discussed. In the second part the transformations to the data and the analyses used for each hypothesis will be explained. In the final part the validity and reliability will be discussed.

Software used for the analyses

For this thesis the statistical software Stata (version 17.0) has been used. This program has been chosen since this is the primary statistical software used in economics. Therefore, the results that have been obtained in this research can be replicated easily by anyone who would like to engage in further research regarding this topic.

Data transformation and analyses method

All data used for this thesis is gathered from the questionnaire. For both hypotheses the output from the questionnaire must be transformed before it is suited for the analysis. The analysis and the corresponding data transformation for each hypothesis will be discussed below.

Hypothesis 1

For the first hypothesis, we are interested in the effect of the risk of missing out on the purchasing decision regarding shopping goods. We want to examine whether the introduction of risk entices people to purchase a product right now instead of delaying the purchase. To assess this, the Mann Whitney U test will be performed. The Mann Whitney U test is used to test whether there is a difference in the dependent variable between two groups. In this case it is used to test whether there is a difference in the shopping behavior between the group with and without risk.

This test is the most fitting to use for three reasons. First, the data that has been gathered is non-parametric. The sample does not follow a normal distribution, it does however follow a similar pattern for both the risk group and the group without risk as can be seen in figure 2 and figure 3 in the appendix. Second, the main dependent variable is measured on an ordinal scale. Third, the independent variable divides the sample into two independent groups. The independent variable used is the dummy variable that indicates whether a participant was in the group in which risk was involved or not. Due to this distinction this variable splits the sample into two groups for which the observations are independent.

The test assesses the difference between the two groups by assigning a rank to all observations. The sum of these ranks is computed and afterwards the sum of the ranks is compared to the expected sum of the ranks. This is what the sum should have been if both groups would have been the same. After this the probability is calculated that this distribution is found in a sample in which both groups are the same. For this a 0.05 significance level will be used. Indicating that if the p-value found is below 0.05, there is evidence to reject the hypothesis that both groups are the same.

To perform this test a new variable must be created. From the questionnaire we have gathered four purchasing decisions for each product. Since the participants have answered if they would purchase the product right now or wait six months to receive a 20%, 30%, 40%, or 50% discount, we can combine this information into one variable that indicates the switching point of an individual. The purchasing decisions have a binary outcome and switch in only one direction where one indicates purchasing the product right now and two indicates delaying the purchase. By adding the outcomes of the four purchasing decisions together we can compute the switching point of an individual. The new variable that indicates the switching point ranges from one to five. One indicates that people will purchase a product right now, even if they can receive a 50% discount. Two, three and four indicate that people switch at the 50%, 40% and 30% discount rate respectively. The number five indicates that people will delay a purchase even at a 20% discount.

In this analysis we will perform the Mann Whitney U test with the variable that indicates the switching point as the dependent variable and the dummy variable that indicates the presence or absence of risk.

Hypothesis 2

For the first hypothesis, we are interested in the effect of the risk of missing out on the purchasing decision regarding convenience goods. To test this the same Mann Whitney U test will be performed. For this hypothesis however, we are interested in the effect on convenience goods instead of the shopping goods that have been assessed in hypothesis 1. For this analysis the same steps will be followed that have been described for hypothesis 1 with the only difference being the dependent variable. Here we create the variable that depicts the switching point regarding the convenience good.

Control variables

In the questionnaire participants have recorded their age, gender and employment status. These variables have been used to assess the success of the randomization process. The Mann Whitney U test does not allow the use of control variables in the analysis; therefore, these variables have not been included.

Missing and inconsistent data

Due to the design of the questionnaire in which people had to record their purchasing decision for different discount rates, it is possible to assess whether people are consistent when answering the questions. Both inconsistencies and missing data could introduce bias, therefore observations that are not consistent or have missing values will be excluded from the study.

Results

This section will discuss the results that follow from the analyses that have been explained in the previous sections. This part will use the same order to discuss the different hypotheses and results as was used in the methodology section. The answers to the hypotheses that have previously been stated will be discussed in the conclusion.

Summary statistics and visual analysis

First, a summary of the sample that was gathered for this study will be given, after which a visual analysis of that data will be conducted. This provides an insight into the gathered data and a useful baseline understanding of the associations between risk and the shopping behavior of the participants. The dataset gathered through the questionnaire consists of 94 respondents from which 11 observations have been removed due to missing or inconsistent data. A summary of the key characteristics is shown in Table 1 and Table 2, shown below. The sample is divided into two groups based on whether there was risk involved in their decision or not (random allocation of participants). First, the control variables will be discussed, after which the purchasing decisions will be discussed. It is clear that in both groups the vast majority of participants fall into the age category of 18-25 years old. In the risk group, this is 94.9%, with the remaining 5.1% being 26-35 years old, and in the group without risk 100% of the participants fall into the category of 18-25 years old. We can also clearly see that most of the participants are students. In the group with risk 92.3% of the participants are students and the remaining 7.7% are employees. In the group without risk 91.1% of the participants are students, 4.5% are employees and 4.5% are self-employed. The final control variable is gender.

Here we observe that most of the participants are male. In the risk group 66.7% is male, 30.1% is female and 2.6% prefers not to disclose their gender. In the group without risk 86.4% is male with the remaining 13.6% being female.

Table 1, Descriptive statistics of sample in absence of risk.

Variable	Obs	Mean	Standard deviation	Min	Max
Shopping goods 20% discount	44	1,227	0,424	1	2
Shopping goods 30% discount	44	1,591	0,497	1	2
Shopping goods 40% discount	44	1,909	0,291	1	2
Shopping goods 50% discount	44	1,955	0,211	1	2
Convenience goods 20% discount	44	1,250	0,438	1	2
Convenience goods 30% discount	44	1,341	0,479	1	2
Convenience goods 40% discount	44	1,386	0,493	1	2
Convenience goods 50% discount	44	1,523	0,505	1	2
age	44	1,000	0,000	1	1
employment	44	1,136	0,462	1	3
gender	44	1,136	0,347	1	2
risk	44	0,000	0,000	0	0

Table 2, Descriptive statistics of sample in presence of risk.

Variable	Obs	Mean	Standard deviation	Min	Max
Shopping goods 20% discount	39	1,103	0,307	1	2
Shopping goods 30% discount	39	1,359	0,486	1	2
Shopping goods 40% discount	39	1,718	0,456	1	2
Shopping goods 50% discount	39	1,897	0,307	1	2
Convenience goods 20% discount	39	1,154	0,366	1	2
Convenience goods 30% discount	39	1,231	0,427	1	2
Convenience goods 40% discount	39	1,333	0,478	1	2
Convenience goods 50% discount	39	1,538	0,505	1	2
age	39	1,051	0,223	1	2
employment	39	1,077	0,270	1	2
gender	39	1,385	0,633	1	4
risk	39	1,000	0,000	1	1

These control variables are used to determine if the randomization process has worked sufficiently. Since there is very little diversification within the control variables it is difficult to assess the success of the randomization process. However, an advantage of the absence of variability in the control variables is that the sample is very heterogeneous, limiting potential influence of these control variables. Since the survey was mainly targeted at students between the age of 18 and 25 these variables are not that well suited to determine whether the randomization was successful. Unsurprisingly, the highest diversification was observed in the variable indicating gender of participants. Here we can observe a substantial difference between the two groups indicating that the randomization might not have been completely successful.

When doing a visual analysis of purchasing decisions of the participants we can spot some interesting results. Figure 1 shows the distribution of the switching points for both goods separated by the risk. It is important to note that the lower the switching point, the higher the required discount rate is to make people delay their purchase. From this we can observe that participants seem to be more likely to delay a purchase in a situation without risk, compared to a situation with risk. When assessing the shopping goods, we can observe that in the situation without risk the interquartile range lies between 3 and 4. The fact that the observations with a value of 1 have been considered as outliers indicates that very few people are not willing to delay their purchase even in return for a 50% discount. When risk is introduced, we see that the interquartile range of the box plot has extended to a range from 2 till 4. With the lower whisker starting at 1 instead of 2. Furthermore, we can observe

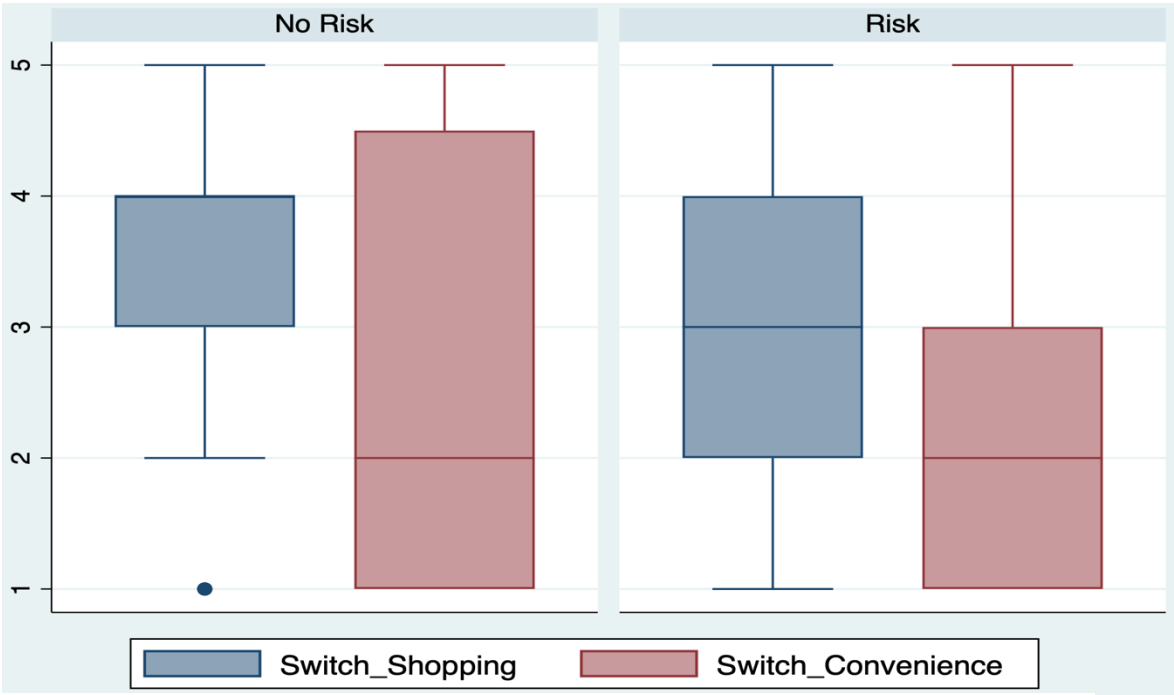

Figure 1, Distribution of the switching points.

that the median has decreased from 3 to 2.

When assessing the convenience goods, we can observe some more interesting results. Here we can observe a major change in the upper limit of the interquartile range. In the situation without risk the interquartile range has an upper limit of 4.5. This has decreased to 3 after risk has been involved. The median of the switching points regarding convenience goods has not changed, however. These findings are a good baseline to understand how the people in the sample behave, but this does not answer any of the hypotheses or the research question yet. The results from the analyses done to answer these hypotheses and the research question will be discussed below, after which the hypotheses and the research question will be answered in the conclusion.

Hypothesis 1

For the first hypothesis, a Mann Whitney U test has been used to analyze how the risk of missing out on the ability to purchase a shopping good affects the purchasing decision. The results from this first analysis can be found in Table 3, shown below. The table shows the number of observations, the sum of the ranks and the expected sum of the ranks for both the group with risk and the group without risk. It also shows the corresponding z-score and the probability score (z-score of 2.496 and a corresponding p-value of 0.012).

Table 3, Mann Whitney U test regarding shopping goods.

risk	Obs	Rank sum	Expected
0	44	2111	1848
1	39	1375	1638
Combined	83	3486	3486

z = 2.496, Prob > |z| = 0.0126, p-value = 0.0124

This indicates that participants who made the purchasing decision in a situation with risk switch from purchasing the shopping good now to delaying their purchase for six months at a lower discount rate compared to the people who made the decision without being exposed to risk.

These findings are statistically significant. This can be derived from the p-value that has been computed. With a p-value of 0.012, we can state that the findings are statistically significant at the 0.05 significance level, since $0.012 < 0.05$.

Hypothesis 2

For the second hypothesis, a Mann Whitney U test has been used to analyze how the risk of missing out on the ability to purchase convenience goods affects the purchasing decision. The results from this second analysis can be found in Table 4, which is shown below. The number of observations, the sum of the ranks and the expected sum of the ranks can all be found in this table. The z-score and p-value are also included. For the convenience goods we have found a z-score of 0.398 and a p-value of 0.6924.

Table 4, Mann Whitney U test regarding convenience goods.

risk	Obs	Rank	Expected
0	44	1889	1848
1	39	1597	1638
Combined	83	3486	3486

z = 0.398, Prob > |z| = 0.6904, p-value = 0.6924

These findings do not show any evidence to state that there is a statistically significant difference between the group with risk and the group without risk.

Conclusion

In this section, the conclusion to all previous sections will be drawn. First, both hypotheses and the main research question will be answered. Second, the strengths and limitations of this paper will be explained. Finally, some recommendations for future research will be discussed.

Hypothesis 1

The first hypothesis was: “When purchasing shopping goods online, being exposed to the risk of missing out leads people to purchase a product now, rather than waiting for it to go on sale.” When assessing the results that have been derived from the Mann Whitney U test, we found a p-value that leads us to reject the null hypothesis for the test. We can therefore conclude that there is a difference in the behavior of people shopping online for shopping goods such as a new coat. Since we have found that the switching point for people in the group without risk is higher than the switching point for people in the group with risk, we can conclude that this effect leads people to be only willing to delay their purchase at a higher discount rate when they are exposed to risk compared to a situation without risk. An important implication for retailers of this finding would be that when customers are aware that products will eventually go on sale for 50%, most customers will delay their purchase. However, if the eventual product will only reach 40% discount, most customers will decide

to purchase earlier. In retail markets such as the clothing market, this is of particular interest, as many brands have reiterating cycles of discount rates at which products will go on sale, which allows the customer to predict at what discount rate certain items will eventually be on sale.

Hypothesis 2

The second hypothesis was: "When purchasing convenience goods online, being exposed to the risk of missing out leads people to purchase a product now, rather than waiting for it to go on sale." When assessing the convenience goods, we can observe a different pattern. Here we have found no statistically significant difference in the behavior between the group that has been exposed to risk and the group that has not been exposed to this risk. From the visual analysis we gathered that there seems to be an association between the exposure to risk and a higher switching point when shopping for convenience goods. The Mann Whitney U test, which showed a p-value of 0.6924, does not provide evidence to reject the null hypothesis for the test. Therefore, we cannot state that there is a difference in the behavior between people who have been exposed to risk and people who have not been exposed to risk when shopping for convenience goods.

There are several explanations that could underlie the absence of findings. First, it is possible that this association is merely not present across different levels of discount rates, and that it is driven by the higher discount rates only. As Blattberg and Neslin (1989) have found, people react strongly to different discount levels. Second, the absence of findings to support the alternative hypothesis could be due to a lack of power, and that the effect could have been observed if more participants were recruited. Third, it is possible that in answering these questions, it is difficult for the participant to pretend as if they really want to buy the project, leading to differential perceptions of the urge to buy the project between participants. Further, the risk of a product running out of stock can be interpreted differently by participants, which increases the difference in perceptions for participants, potentially increasing the noise in the data acquired due to measurement error. Finally, the data gathered for the current study was obtained during the COVID-19 pandemic, a period in which there were fewer opportunities, for people in the age range in which most of the study participants were categorized, to spend their money in the way that pre-pandemic 18 - 25-year-old youths would spend their money. The impact of the covid-19 pandemic on the spending behavior has been discussed by Sharma, A., & Jhamb, D. (2020) and Jin, X., Zhao, Y., Song, W., & Zhao, T. (2021). Who have all found that spending behavior has changed during the Covid-19 pandemic. If indeed, the average person now has higher savings, it may be that the financial incentive to buy goods at a

discounted price is lower, which may in turn lead to lower effect estimates or in this study the absence of evidence for an effect.

Research question

To conclude, how does the exposure to the risk of missing out affect the shopping behavior of students in The Netherlands? After the research conducted for this paper, we can partially answer this research question. What we have found is that risk has, at least regarding shopping goods, an effect on the shopping behavior of students in The Netherlands. We can conclude that when purchasing shopping goods, people who are exposed to risk demand a higher discount rate to delay their purchase, compared to people who are not exposed to this risk. Furthermore, we can conclude that there is a difference in the impact of risk between shopping goods and convenience goods.

Discussion

In this section, the limitations of the research will be addressed as well as possible improvements to the research and recommendations for future research. The first limitation is the relatively small sample, which may potentially have led to a lack of power to detect statistically significant findings. This study does, however, provide the foundation for future studies to base expected effect sizes on, which can, with pre-specified boundaries of effects of interest, accommodate equivalence testing, by which it can be determined whether the absence of an effect observed here is due to a lack of power, or due to the absence of an effect. Furthermore, the sample that has been used is relatively homogeneous, which can be considered both a limitation and a strength. The fact that it mainly consists of students between the ages of 18 and 25 of which over 77% is male means that these findings are difficult to generalize for the entire population, which constitutes the limitation. Regarding the question of how risk influences the shopping behavior of students in The Netherlands however, this can also be seen as a strength. This is because we can expect the participants to be relatively comparable and therefore the background characteristics will most likely be similar. This indicates that the effect that we have found in this research is largely the effect of the exposure to risk. It must be said that in this paper there is likely to be an effect of unmeasured confounding. It is highly plausible that there are a multitude of factors that are not measured here that can influence shopping behavior. For example, the outcomes may depend on an individuals' internal motivation to buy a coat, or the price at which the coat was specified to be selling may influence the shopping behavior dependent on the monthly budget of the participants. These unobserved variables can impact the findings and the effect found in this study might therefore be different from the population effect. Another limitation is that there were no real incentives in this paper. This might

lead to a different outcome compared to a situation where participants are making an actual purchasing decision. In this study situation, the coat that participants have been told they want to buy is just a word. In a real-life situation, they actually see a picture of the coat they want to buy. In our experiment, people might think they are willing to wait six months to get a 30% discount when in reality they might act differently because they can actually see the product. The final note that has to be made is that this research was conducted during the Covid-19 pandemic. This might also influence the behavior of people compared to a situation without this pandemic. When this research was conducted bars and restaurants in The Netherlands were closed. According to the NIBUD students spend approximately €124,- each month on leisure, going out and sport. Since most of this was not possible, it can be expected that students spend a part of this money on things like online shopping.

The current findings also provide ample directions for future research. First, given that the majority of the current sample included students in a relatively young age group, an important extension would be to assess to what extent these findings translate to a population with older adults. On the one hand, it could be expected that most adults will have a larger monthly budget, which may make it easier for them to spend this amount of money on a coat. On the other hand, students may, due to the wide availability of student loans at relatively low rates in the Netherlands, and the psychological phase of emerging adulthood in which these students are developing their own behavior, may lead to higher impulsivity in this age range by which spending money on a coat instantly may be more likely. Second, for retailers, it will be of high interest to assess whether there are differences in the impact of risk regarding different discount rates. This could lead to better decision making from the retailers regarding sales optimization.

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Appendix

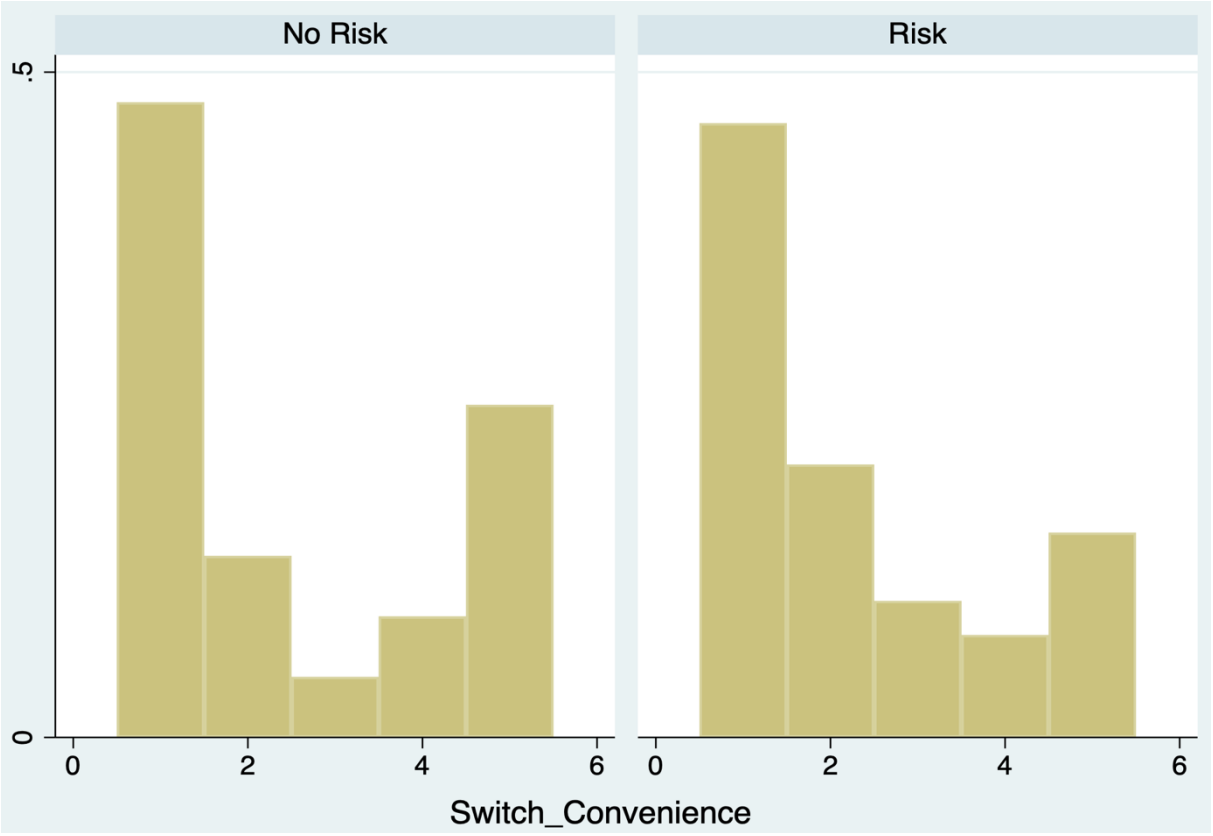

Figure 3, Distribution of the switching points for convenience goods.

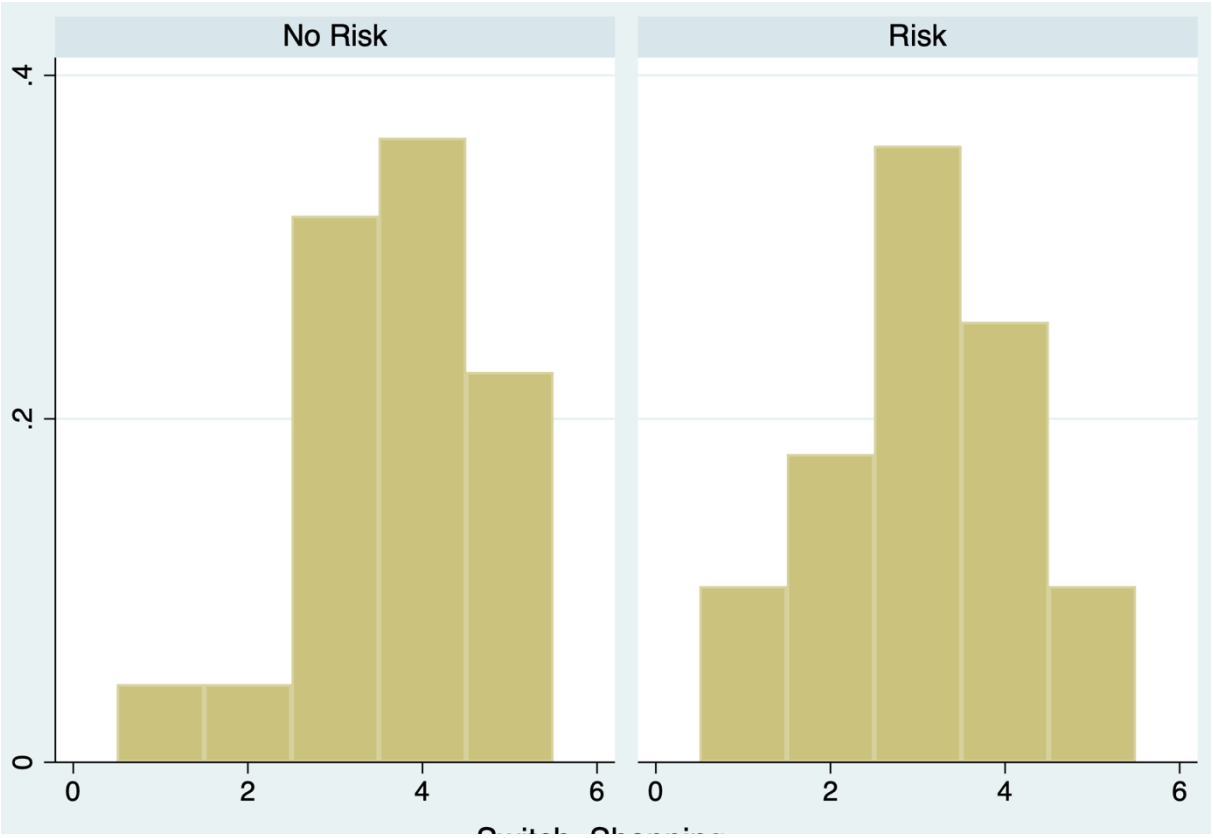

Figure 2, Distribution of the switching points for shopping goods.

Questionnaire

Start of Block: Block 2

Q17 This experiment is about choices regarding online shopping. Before you start the survey, first a small informative text.

This experiment will contain two products. Both products will go on sale in six months' time. If you decide to wait until the products go on sale, they could be out of stock. Therefore there is a risk of losing out on the possibility of purchasing the product.

Page Break

Q18 For the first product imagine you want to buy a new coat. Now you see the perfect coat at an online shopping site. The coat costs €200,- at this moment. You know for sure that the coat will go on sale in six months' time. You realize there is a chance the coat is sold out and you won't be able to buy the coat.

Q21 Imagine the discount will be 20% in six months' time, therefore the price will be €160,-.

Will you buy the coat right now or in six months' time?

○ Right now (1) ○ In six months' time (2)

Q22 Imagine the discount will be 30% in six months' time, therefore the price will be €140,-.

Will you buy the coat right now or in six months' time?

○ Right now (1) ○ In six months' time (2)

Q23 Imagine the discount will be 40% in six months' time, therefore the price will be €120,-.

Will you buy the coat right now or in six months' time?

○ Right now (1) ○ In six months' time (2)

Q24 Imagine the discount will be 50% in six months' time, therefore the price will be €100,-.

Will you buy the coat right now or in six months' time?

○ Right now (1) ○ In six months' time (2)

Page Break

Q25 Imagine you want to buy some new shampoo. Each bottle of shampoo costs €5,-. From past experience you know that your favorite shampoo always goes on sale every six months. You can either buy shampoo at the full price or you can stock up on shampoo when it is at a discounted price. You are uncertain if the shampoo will be in stock in 6 months' time. The product range might change or the producer might not make this specific shampoo anymore.

Q26 The discount will be 20% in six months' time, therefore the price will be €4,- per bottle of shampoo.

Will you buy shampoo right now or in six months' time?

○ Right now (1) ○ In six months' time (2)

Q27 The discount will be 30% in six months' time, therefore the price will be €3,50 per bottle of shampoo.

Will you buy shampoo right now or in six months' time?

○ Right now (1) ○ In six months' time (2)

Q28 The discount will be 40% in six months' time, therefore the price will be €3,- per bottle of shampoo.

Will you buy shampoo right now or in six months' time?

○ Right now (1) ○ In six months' time (2)

Q29 The discount will be 50% in six months' time, therefore the price will be €2,50 per bottle of shampoo.

Will you buy shampoo right now or in six months' time?

○ Right now (1) ○ In six months' time (2)

End of Block: Block 2

Start of Block: Default Question Block

Q3 This experiment is about choices regarding online shopping. Before you start the survey, first a small informative text.

Often products are initially sold for a certain price and after some time they are sold at a discount. Therefor you could get the product for a lower price if you are willing to wait until the sale starts. In this experiment you will be asked about two goods. For both goods you can assume that there is no risk of the product going out of stock.

Page Break

Q12

For the first product imagine you want to buy a new coat. Now you see the perfect coat at an online shopping site. The coat costs €200,- at this moment. You know for sure that the coat will go on sale in six months' time. In the sale you are also sure that your size will still be available.

Q2 Imagine the discount will be 20% in six months' time, therefore the price will be €160,-.

Will you buy the coat right now or in six months' time?

○ Right now (1) ○ In six months' time (2)

Q4 Imagine the discount will be 30% in six months' time, therefore the price will be €140,-.

Will you buy the coat right now or in six months' time?

○ Right now (1) ○ In six months' time (2)

Q5 The discount will be 40% in six months' time, therefore the price will be €120,-.

Will you buy the coat right now or in six months' time?

○ Right now (1) ○ In six months' time (2)

Q6 The discount will be 50% in six months' time, therefore the price will be €100,-.

Will you buy the coat right now or in six months' time?

○ Right now (1) ○ In six months' time (2)

Page Break

Q13 Imagine you want to buy some new shampoo. Each bottle of shampoo costs €5,-. From past experience you know that your favorite shampoo always goes on sale every six months. You can either buy shampoo at the full price or you can stock up on shampoo when it is at a discounted price. You are certain that the shampoo will be in stock in 6 months' time.

Q8 The discount will be 20% in six months' time, therefore the price will be €4,- per bottle of shampoo.

Will you buy shampoo right now or in six months' time?

○ Right now (1) ○ In six months' time (2)

Q9 The discount will be 30% in six months' time, therefore the price will be €3,50 per bottle of shampoo.

Will you buy shampoo right now or in six months' time?

○ Right now (1) ○ In six months' time (2)

Q10

The discount will be 40% in six months' time, therefore the price will be €3,- per bottle of shampoo.

Will you buy shampoo right now or in six months' time?

○ Right now (1) ○ In six months' time (2)

Q11 The discount will be 50% in six months' time, therefore the price will be €2,50 per bottle of shampoo.

Will you buy shampoo right now or in six months' time?

○ Right now (1) ○ In six months' time (2)

End of Block: Default Question Block

Start of Block: Block 2

Q7 How old are you?

- 18-25 (1)
- 26-35 (2)
- 36-45 (3)
- 46-55 (4)
- 56+ (5)

Q14 What is your employment status?

- Student (1)
- Employee (2)
- Self-employed (3)

Q15 What is your gender?

- Male (1)
- Female (2)
- Non-binary / third

gender (3) ○ Prefer

not to say (4)

End of Block: Block 2
