

**Blind box and risk attitude**  
**–Behavioural insights behind the rising market**

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## **Abstract**

Inspired by the effect of behavioural insights on traditional gambling, the author designs a questionnaire to collect data from blind box consumers in China, in order to find out whether the deviation between risk-averse belief and risk-taking investment which happens on gamblers would also exist among blind-box consumption. The econometric analysis suggests that people with higher degree of risk-averse will spend less on blind box, while previous experience on blind-box mechanism could flatten such influence. Further analyses on control variables indicate that for younger generation, internal factors do not play a major role in their decision-making process of blind-box consumption. Nevertheless, further study with bigger sample size is expected to dig deeper into this topic, and attract more attention to regulate this emerging market.

## 1. Introduction

Blind box, which originally refers to small toy figures wrapped in an opaque package, is now a trending culture being popular among young generations all over the world. In China, the idea seems to be new but is expected to experience a strong growth. Before the market leader Pop Mart launched in the Hong Kong Stock Market in 2019, the blind box didn't attract much attention from the mass media. However, according to the biggest Chinese electronic business platform Tmall, action figures and designer toys have become the most attractive commodities and created the highest sales among young generations who has born after 1995 in 2019 (ChinaDaily,2019). The rapid growth didn't slow down during the global pandemic. On the contrary, the market of designer toys has increased by 19.7% globally in 2020. Meanwhile, in China, the market has reached an incredible increase of 44% (iiMedia Research, 2021).

While the investors are crazed by the potential of this industry, many has wondered what makes the small toys so attractive. Many economists and psychologists believe that the craze is triggered by a good marketing strategy and people's desire for uncertainty (Tang, 2021), whereas the theoretical explanation doesn't stop investors from benefitting from the mechanism. Nowadays, you can find the blind box mechanism in every commodity: food, daily necessities, cosmetics, even air tickets and pets can be made into blind boxes (Chinanews.com, 2021).

Given its nature of uncertainty, blind box sometimes reminds people of gambling. Researchers have proved that gamblers often realise their gambling behaviour is riskier than their beliefs after the game (Ladouceur et al., 2003; Nower and Blaszczynski, 2010). Hence, this paper is trying to identify whether the same deviation between belief and practice also exist among blind box consumption.

This study is of great significance. In a theoretical sense, the quantitative research conducted in this thesis on blind box spending and consumers' risk preferences is missing from the past literature, which implying that this thesis can fill a gap in the existing research and learn more about how people's risk preferences affect their spending on blind boxes. In addition, in a practical sense, the results of this study can

guide the government in formulating more rational management measures related to blind boxes and guide consumers in the correct consumption of blind boxes. In particular, for some minors, they may not be able to establish the correct blind box consumption behaviour and incorrectly promote a gambling mentality. Policy guidance on blind boxes can mitigate this risk, thus reducing the potential for speculative or gambling consumption.

To verify the deviation, this paper focuses on two hypotheses. Theoretically, people's risk attitude should indicate his or her behaviour under uncertainty. Since the blind box is designed to be opaque, the result of consumption is uncertain, making the purchasing behaviour an uncertain event. Therefore, the first hypothesis is: the more risk-averse the person is, the less he or she should invest in uncertain prospects like the blind box.

Apart from the risk attitude, numbers of studies suggest that the degree of risk-taking in financial investment is decreasing with experience (Graham, 1999; Li, 2002; Boyson, 2003; Menkhoff et al., 2006). Though the results could be ambiguous when taking different investment techniques into considerations, researchers believe that the learning process can help build up a more comprehensive understanding of the market, which shall lead to less risky investment decisions (Menkhoff et al., 2006). Hence, the second hypothesis is that consumers who have purchased blind boxes or experienced similar mechanism in the past will tend to invest less in blind boxes in the future. This thesis focuses more on whether past experience with blind box purchases amplifies or attenuates the effect of risk appetite on uncertain future investments (e.g. blind boxes).

In this paper, a questionnaire is designed to collect data from actual blind box buyers in the Chinese market. The OLS estimation technique is implemented to analyse the causal effect between the blind box consumption and the risk attitude of the subject. Statistical results suggest that risk attitude has a significant influence on the consumption of blind boxes. Specifically, for newcomers who have not purchased a blind box in the past, risk averse consumers will spend less money than relatively risk seeking consumers. However, past experience with blind box mechanism could mitigate the effect of risk attitude. This means that risk averse consumers are more

reluctant to follow their original instinct, but more willing to take unknown risks by purchasing a blind box. At the same time, tests on age indicators suggest that internal factors do not explain changes in blind box consumption among younger generations as strongly as they do among older people.

To the best of my knowledge, most of the existing literature on the blind box is concentrated more on its marketing strategy and expansion scale. This paper shall be the first study to quantify the behavioural insights of blind box consumers using field data, shall lead to a more comprehensive understanding of the blind box market from the demand side. Hopefully, this paper could act as a pilot study, attracts more attention to this market which is expanding brutally.

## **2. Literature review**

### 2.1 History of the blind box

Nowadays, as the market of blind boxes expanding rapidly, the definition of the blind box becomes very vague, so does its origin. However, most of the related literature agrees that the idea of the blind box is originated in Japan (Gao, 2020; iMedia Research, 2021; Tang, 2021). Some claimed the idea of the blind box is originated from the Japanese marketing approach called fukubukuro, which is also called “lucky bag” when the idea is quoted overseas. Same as the blind box, when you purchase a lucky bag, you cannot see through the package. The manufacturer will randomly assign similar goods into different lucky bags, so when the bag is sold to the consumer, even the seller won't know what is exactly inside. The bag is usually priced at a discount on its contents. Therefore, consumers are willing to “try their luck” to see if they can get the exact commodity they want, hence, increase the sales and help clear the inventory (Gao, 2020; kinsencandy.jp, 2021).

Though the exact time of when lucky bags are invented is controversial, it is widely accepted that said marketing strategy is imported into China during the 1990s. Some local snack manufacturers sense the potential, designed several sets of game cards based on characters from famous ancient Chinese novels and put them into the package of

snacks as free gifts. Since the cards are well-designed, consumers will try to collect their favourite characters or make a collection of the whole set, which motivated them keep purchasing the snacks and increase the sales (Neo-consumer, 2020). This could be regarded as the most primitive application of the blind box mechanism in China.

The current mania of the blind box is ignited by the market leader Pop Mart. Before the company hired toy designers and created their own designer toy series “Molly” in 2016, the blind box stays as a mere marketing approach, often tied with derivative merchandise based on mature intellectual properties related to the ACG area (Gao, 2020; iMedia Research, 2021; Pop Mart, 2021). In the last two to three years, with the help of external investment, Pop Mart has successfully promoted the idea of “designer toy”, distinguish from other derivative merchandise and expanded their own niche market. Meanwhile, they still benefit from the original ACG-related market base, cooperate with big intellectual properties like Disney, Pokemon, Hello Kitty, etc. Nevertheless, these jointly-designed blind boxes still have significant designer style, differentiate them from the existing derivative merchandise, which helps further promote the brand name and enhance the public awareness of designer toys.

From the perspective of marketing, the characteristic which distinguishes the blind box from the original lucky bag and game cards is the “designer toy” idea. Before 2016, the blind box is recognised as a promotion method, which only plays a minor part to incentivise consumption of general commodities and existing brand names. In other words, the designer toy concept helps dig up the business value of the blind box itself, turn the marketing approach into a commodity.

## 2.2 The blind box mechanism

It is clear that the biggest difference between the blind box and other toys in the same variety is the lack of transparency. By putting the designer toys into the opaque package, the seller and the buyer are equally ignorant of the trading commodity, which emphasis the uncertainty from the perspective of the buyer. According to Hsee and Ruan (2016), we are all naturally craving for the uncertainty, which is known as “the Pandora effect”, as the famous Greek mythology.

*Pic-1. An offline retail store of blind box*



*Pic-2. The illustration of regular and secret design on the package*



Apart from the opaque package, another salient feature of the blind box mechanism is the so-called “secret design”. Normally, the entire set of a series of blind boxes will be clearly illustrated on the package of each blind box, and the chance to get each design is the same. However, some series also includes some secret designs, which will not be announced on the package or disclosed by the designer. Customers need to be “extremely lucky” to get it since the total amount of such secret designs is quite small, compare to other designs. Generally speaking, these secret designs are like limited

edition but with more uncertainty. The rareness of secret designs makes them extremely valuable. According to Tang (2021), some popular secret designs can be traded at 40 times to the retailer's price on the second-hand online market.

### 2.3 Behavioural insights behind the blind box mechanism

In the practice, there are different behavioural insights behind the process of blind-box purchase. The very first attempt at the blind box usually start with a small initial investment, normally around 50 yuan (about 8 euros) per blind box. For the regular design, it is possible to purchase the entire set at once. However, by separating the entire set into 8 to 12 different designs, the consumers are under the impression that they can try to spend less and only collect those designs they preferred. In other words, they may fall into the illusion of control. Langer (1975, p. 113) first introduced the term "illusion of control". She defined it as "the expectation that an individual's probability of success is unduly higher than can be guaranteed by objective probabilities". Presson and Benassi (1996) state that much of the early empirical research on illusion of control was related to the illusion of prediction rather than outcome. Thompson (1999) uses a rather narrow definition. He describes the illusion of control as an overestimation of one's ability to control a random event with a known probability distribution, such as the roll of a die. No matter how the dice are rolled, where and who they are, the probability distribution of the outcome is not affected. If a person believes that he or she influences the outcome of the roll by rolling the dice, then it is fair to say that this person is susceptible to the control bias illusion (Fellner, 2009; Charness and Gneezy, 2010).

Meanwhile, the relatively low price of each blind box also reduces the salience of money, which is also a technique commonly used in gambling, as an application of mental accounting (Gainsbury, Suhonen & Saastamoinen, 2014). Mental accounting theory describes how people set a mental budget for a particular category of expenditure and then spend with that budget in mind (Thaler, 1985). Pretnar et al. (2016) suggest that this non-substitutability feature of mental accounting means that consumers may maximise utility within separate budget constraints for different commodity categories. Heath and Soll (1996) show that people tend to track consumption according to a pre-



determined mental budget and ignore spending in other accounts, which may lead to over- or under-consumption. According to mental accounting theory, customers analyse transactions in two stages: evaluating potential transactions (judgement process) and disapproving or approving each potential transaction (decision process). In order to evaluate potential transactions, Thaler, (1985) proposed two types of utility: transaction utility and acquisition utility. Acquisition utility is the value of the goods received compared to the expenditure (Thaler, 1985). The target price is the total amount that the customer would have to pay to receive/use the product. Transaction utility refers to the perceived advantages of a transaction or deal. It is based on the difference between the target price and the reference price of the product. The reference price refers to the price that customers expect to pay for the product (Thaler, 1985). Customers derive the reference price from their previous experience or from the sales information they receive (Puto, 1987). The total utility of a purchase is the sum of the purchase utility and the transaction utility (Thaler, 1985). When making a purchase decision, the customer makes a decision to maximise his total utility by referring to the mental account corresponding to the product being purchased (Thaler, 1985). A particular psychological account is limited by the budget allocated to that psychological account. According to the theory, the low price of a blind box leads to a lower target price and a higher reference price for the customer, which increases the transaction utility and, in turn, the total utility of the purchase. This further facilitates the decision to consume blind boxes. However, existing research has not adequately used mental accounting and the illusion of control to explain the psychology of consumption under a blind box.

Once the consumer starts to purchase the blind box, one possible result is they get their favourite designs or the secret design in the first few attempts. Statistically, we know that the result of the purchase of each blind box is independent. However, in this circumstance, the consumers may believe they can keep the “luck” and get their preferred designs in other series easily. This is a superstition that generally happened among gamblers called “hot hand” (Ayton and Fischer, 2004). From the perspective of behavioural economics, it can be regarded as the representativeness heuristic. Besides, some blind box buyers also have other superstition about performing certain formalities

can increase the chance of getting the secret design, which is also an embodiment of the representativeness heuristic (Tang, 2021). Miller & Sanjurjo (2018), however, refute this theory. Their study confirms that the classical study in Gilovich, Vallone & Tversky (1985) incorrectly used a biased selection procedure. After conducting a debiased analysis, Miller & Sanjurjo (2018) found that the long-term conclusions of the classical studies were the opposite. Past contradictory research findings suggest that past purchase experiences will further influence their subsequent consumption decisions.

The other possibility is the failure continues. Some consumers may give up when their consumption reaches their pre-set budget. Others may keep adding extra investment since they cannot forgo the previous spending. Such kind of loss-chasing behaviour relates to loss aversion in the behavioural economic domain (Arkes and Blumer, 1985). Zhang and Clark (2020) claim that loss-chasing describes the tendency of gamblers to extend their bets in order to make up for previous losses while Hadlaczky et al., (2018) describe loss aversion as the human tendency to strongly prefer avoiding losses to gaining equal benefits. Therefore, no matter the consumer is “lucky” or not, the combination of mental accounting with either the representativeness heuristic or the loss aversion shall plunge he or she into the abyss of the blind box.

Meanwhile, the research of Harrigan et al. (2014) proves that optimism bias is more likely to happen as the time and money spent increase. According to Sharot (2011), given the importance of these future predictions, one might expect the brain to have accurate and unbiased foresight. However, when humans make future predictions, they overestimate the likelihood of positive events and underestimate the likelihood of negative ones. In other words, as the consumer suffers from either representativeness heuristics or loss aversion and keeps buying the blind box, the possibility of he or she being overconfident shall increase. They are likely fall into the miscalibration that their chance to get the blind box they want is higher than the average.

#### 2.4 Factors that may or may not affect one’s consumption of the blind box

Under the expected utility theory, risk attitude is used to indicate the shape of one’s

utility function (Kahneman and Tversky, 1979). Therefore, in a blunter way, risk attitude is the characteristic that indicates one's preference between a certain result and a prospect.

Though risk attitude is regarded as a personal trait (Weber et al., 2002), studies among gamblers indicate that people can betray their pre-set budget and deviate from their beliefs during the game (Ladouceur et al., 2003; Nower and Blaszczynski, 2010), which challenge the effect of risk attitude. Besides, even proper cognitive training may fail to stop gamblers from making emotional decisions (Williams and Connolly, 2006).

According to Fortune & Goodie (2012), overconfidence is a phenomenon in which participants demonstrate a degree of confidence in their knowledge or ability that is not guaranteed by objective reality. The experiment by Koriat, Lichtenstein and Fischhoff, (1980) provides an explanation for overconfidence. In an experiment, participants may answer a number of trivial questions, assessing their level of confidence in each answer, usually as a percentage. At the end of the study, it may be found that the average expressed confidence exceeds the proportion of questions answered correctly. Research has found that individuals are particularly overconfident when expressing high levels of confidence. In one study (Fischhoff, Slovic and Lichtenstein, 1977, Experiment 1), participants expressed certainty, or 100% confidence, on 20% of the answers, but the accuracy rate for these items was only 83%. In the same study, when participants thought they were 100 times more likely to be right than wrong (100:1), they were four times more likely to be right than wrong. When they thought they were a million times more likely to be right than wrong, they were only 20 times more likely to be right. While the blind box mechanism put consumers at high risk of suffering from overconfidence, the empirical study of Menkhoff et al. (2006) suggests that the miscalibration due to overconfidence is decreasing as the experience in the financial market increase. Therefore, the experienced consumers shall have a more comprehensive understanding of the blind box market, hence, be more resistant to optimism bias.

However, though the experience may cancel out the effect of overconfidence, it could lead to a new problem. According to Schacter et al. (2011), the famous "Skinner

box” explains the power of different schedules of reinforcement. In the blind box mechanism, the way consumers get their favourite designs or the secret designs is following the variable ratio schedule (Tang, 2021), which is the most addictive one among all the schedules. That is to say that being more experienced is more likely to be addicted to the mechanism.

In addition, a number of demographic attributes are thought to influence people's consumption behaviour on blind boxes. For example, the market director of Pop Mart reveals that the company is focusing on the niche market of young females aged between 17 to 35 (Harper, 2020). Previous literature has ambiguous conclusions on the effect of gender on risk attitudes. Schubert et al. (1999) suggest that gender-specific risk behaviour is not significantly related to gender. However, the study of Menkhoff et al. (2006) proves female fund managers are more risk-averse than their male peers.

### **3. Methodology**

Based on the behavioural insights and previous studies such as Menkhoff et al. (2006) and Schubert et al. (1999), this paper will focus on the relationship between the risk attitude of the subject and their consumption of blind boxes. To be specific, this paper is particularly interested in the deviation between the belief and practice, which, in this case, refers to whether a person with a higher degree of risk-aversion appears to be more interested in risky decision, such as purchasing blind boxes.

#### **3.1 Questionnaire design**

Under the current pandemic of Covid-19, an online questionnaire is designed to collect field data from blind box buyers. This questionnaire contains 9 questions, covers the information of respondents on risk attitude, blind box consumption and demographics which are designed to be control variables in the data analysis. To avoid confusion, all questions and instructions are written both in English and Chinese. A sample of the questionnaire is available in the Appendix.

In the beginning, a disclaimer is displayed to the subject, which briefly introduces

the purpose of this questionnaire and makes them understand their privacy will not be violated. Then, the first question is designed to identify the risk attitude of the subject by a choice list. They are given a hypothetical question, which asks them to make a choice between a prospect and an incremental sequence of certain payoff, which is illustrated in *Table 1*. The prospect is fixed, while they need to consider the level of payoff that they are willing to switch.

*Table 1. The choice list from the questionnaire (translated in English)*

Option A: keep the ticket	Option B: sell the ticket
40% of getting 50 yuan; 60% of getting a 20-yuan refund	Selling at 50 yuan
	47 yuan
	44 yuan
	41 yuan
	38 yuan
	35 yuan
	32 yuan
	29 yuan
	26 yuan
	23 yuan
	20 yuan

Following the choice list, subjects will receive an illustrated explanation of the definition of blind boxes. There are pictures and text to make sure they understand the blind box which is discussed in the following questions is the designer toy, not other commodities which applies the blind box mechanism. Then they will be asked to report their consumption on the blind box in the last 12 months, in terms of quantity and money spend.

Before the demographic questions, subjects are asked to report their past experience with the blind box mechanism. According to Menkhoff et al. (2006), fund managers who have no less than 5 years of experience in trading in the financial market can be regarded as “experienced”. However, in the case of the blind box, the trend started in 2016. Even the most experienced buyers won’t fit the classification from the previous literature. Hence, in this paper, the definition of “experienced” is whether the subject has been exposed to the blind box mechanism. To put it bluntly, the aim of this

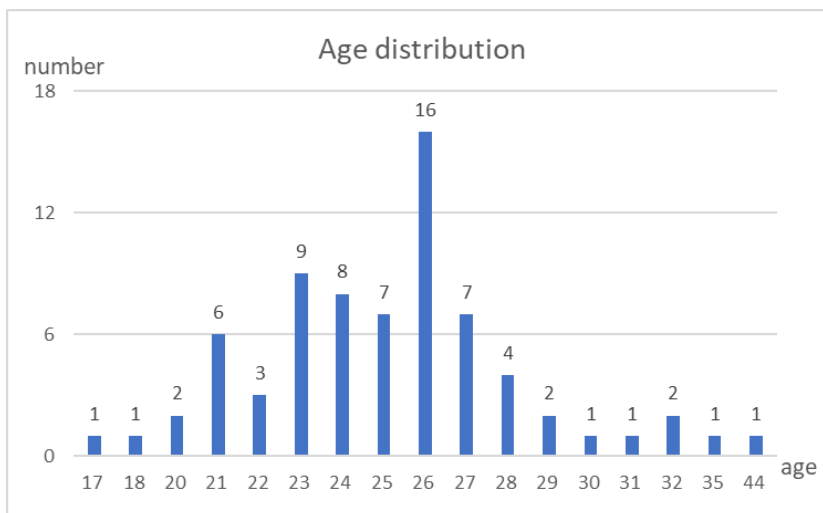
question is to figure out whether the respondent has purchased other commodities which fits the definition of blind box but not “the blind box” which are regarded as designer toys. In the questionnaire, some popular forms of entertainment contain the blind box mechanism are mentioned as examples to help the subject to understand. Besides, to eliminate the misunderstanding, once subjects report themselves as “experienced”, an additional question will appear to make sure their experience involves consumption.

After that, subjects will face 4 questions regarding their demographic information, which refers to their age, gender, disposable income level and place of residence. Ross and Reynolds (1996) point out that income nonresponse could be due to different reasons, but setting selections instead of asking subjects to fill in the blanks could get a better rate of response. Out of concern for the lack of response, the question regarding disposable income is designed as a multiple-choice question. Subjects only need to choose whether their disposable income is higher or lower than the average level of the citizens in China in the last 12 months.

### 3.2 Data description

The questionnaire is designed on the Qualtrics platform. In the end, a total of 161 responses were received with a total of 72 effective responses.

*Figure 1. The age distribution of the sample*

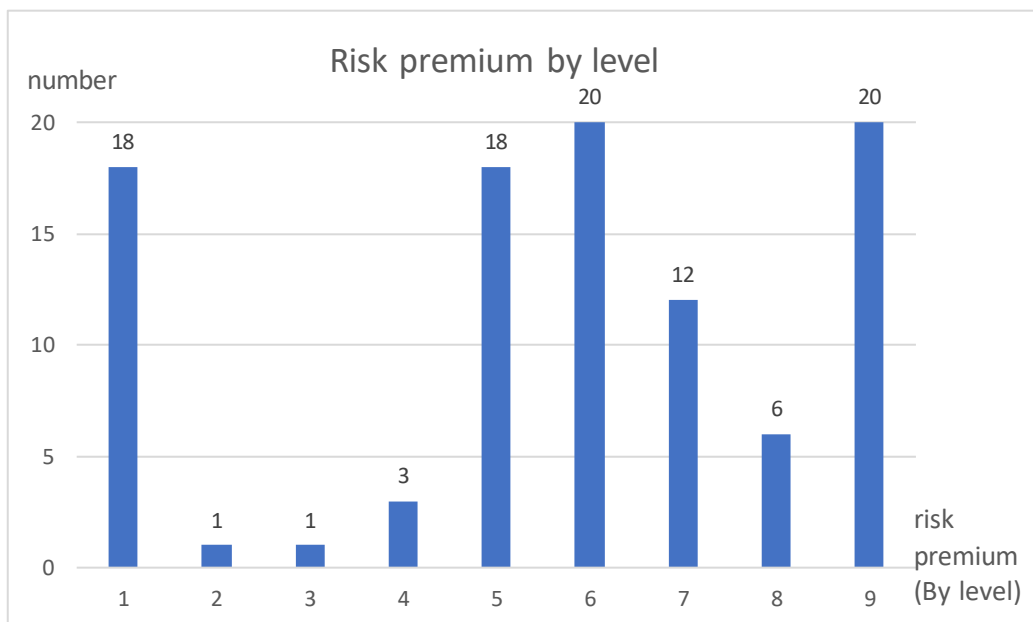


*Figure 1* displayed the distribution of age of the sample. Among the 72 effective

respondents, the range of the age is between 17 to 44 years old, but the mode is 26 years old. Most of the respondents are female since only 12 respondents are male while there are 60 female respondents. As for the place of residence, the 72 respondents come from 12 different provinces or municipalities. Shanghai is the most common answer. However, there are 9 respondents who didn't specify their answer to the provincial level.

The questionnaire collects the data regarding consumption on blind boxes of the respondent, measured by money spent and units purchased. However, during the data collection, one respondent is found out might made a typo and mistakenly fill in the same number for the money spent and units purchased. Hence, in the analyse procedure, only the money spent is used as the measurement of one's consumption on blind boxes. For those who don't remember the exact amount, their consumption is rounded down to the closest integer. Overall, the money spent on blind boxes in the last 12 months of the respondents is ranged from 20 yuan to 20000 yuan.

Figure 2. The risk premium distribution (by level) of the sample



Though the original questionnaire has set 11 elements, none of the subjects selects the second lowest and the second highest option among the choice list. Hence, their options are divided into 9 levels, representing respondents' risk premium from highest (level-9) to lowest (level-1), which can be a numerical indicator of their risk attitude. In other words, the higher the risk premium level, the more risk-averse the subject. Respondents whose risk premium ranks at the lowest level hold the most risk-seeking

attitude among the subjects, vice versa.

The results of the risk premium level based on levels 1-9 confirm that the highest risk premium (level-9) and lowest risk premium (level-1) respondents are 20 and 18 respectively, and that the number of respondents with neutral risk premium (level 5 and level 6) is also high at 18 and 20 respectively. This indicates that the respondents' premium for risk is high at all three levels: highest, lowest and neutral.

### 3.3 Empirical strategy

Therefore, this paper will use an OLS estimation method to analyse the causal effect of risk attitude on consumption of blind boxes. The regression model can be shown as:

$$\begin{aligned} investment_i = & \beta_0 + \beta_1 risk\ attitude_i + \beta_2 experience_i \\ & + \beta_3 experience_i \times risk\ attitude_i + \beta_4 X_i + u \end{aligned}$$

In this model, the dependent variable is the total investment on the blind box of subject  $i$  in the last 12 months. The main determinant here is the risk attitude of the subject  $i$ . As mentioned in Section 3.1, the risk attitude of the respondents is converted into a categorical variable: their risk attitude is measured by their risk premium, which can be classified as 9 levels, while the lowest level (Level 1) represents the most risk-seeking attitude and the level of risk-averse increase as the level increases. Since previous studies have pointed out the ambiguity of the influence of experience on blind box purchase, this paper will lay more emphasis on the effect on risk attitude. In this model, an interaction between the experience term and the risk attitude term is included, which shall indicate how much change in the investment of blind box is due to experience as the risk attitude changes by one unit.

Besides, several demographic variables are introduced as controls. They are denoted as  $X_i$  in this model. Apart from age and gender and the disposable income level, which are highlighted by the supply side and discussed in previous literature, the place of residence is included as well. This is because the social customs, ethical groups and other social norms varied in different municipalities in China (National Bureau of Statistics of China, 2011).



#### 4. Results

Table 2. The OLS estimation of risk attitude and blind-box consumption

VARIABLES	(1)	(2)
Risk premium:		
Level 2	-10.45 (7.382)	-13.38 (9.320)
Level 3	-6.247 (7.382)	-9.178 (9.320)
Level 4	-71.50 (45.28)	-146.5*** (39.28)
Level 5	-74.41 (45.28)	-149.4*** (39.28)
Level 6	-65.40 (45.39)	-140.4*** (39.41)
Level 7	-74 (45.28)	-148*** (39.28)
Level 8	-71 (45.28)	-146*** (39.29)
Level 9	-63.95 (46.20)	-135.3*** (40.93)
Experience	-64.25 (45.88)	-136.3*** (40.37)
Risk premium*Experience		
Level 4*Experience	60.75 (45.88)	
Level 5*Experience	89.64* (48.13)	165.2*** (43.63)
Level 6*Experience	61.48 (46.12)	135.3*** (40.73)
Level 7*Experience	70.92 (46.18)	145.3*** (41.01)
Level 8*Experience	62.38 (45.89)	135.2*** (40.39)
Level 9*Experience	66.32 (47.30)	137.7*** (42.82)
Constant	75 (45.28)	150*** (39.28)
Observations	99	79
R-squared	0.166	0.345

Robust standard errors in parentheses

\*\*\* p<0.01, \*\* p<0.05, \* p<0.1

Table 2 indicates the result of an OLS estimation which only contains the key

variables: the risk premium, experience and the interaction between risk premium and experience. To simplify the results, the dependent variable here is the original data of money spent on blind boxes divided by 100. While Column 1 lists the results of the entire sample (99 respondents), Column 2 excludes those who has reported zero investment in blind box during the last 12 months. Though the coefficient of risk premium level 2 and 3 are not statistically significant, the results from both Column 1 and Column 2 indicates that compared with the respondents with the lowest level of risk premium (those who are relatively the most risk-seeking ones in the sample), those who are more risk-averse tend to spend less on blind box during the testing period.

By excluding the non-player respondents, the significant level of the key variables increases, so does the R-square. Column 2 indicates that among the respondents who were actual blind box players, experienced players would spend less on blind boxes, *ceteris paribus*. However, except for the level 2, 3 and 4 results are omitted since the respondents respect to said risk premium levels are all experienced, those positive coefficients of the interaction terms shows that experience could mitigate the effect of risk attitude. In other words, compared with those with the most risk-seeking attitudes (level 1 respondents), being experienced would increase the investment on blind boxes, although the respondent appears to be more risk-averse in the previous financial decisions. Such result is in line with the famous “Skinner box” and proves the theoretical inferences from Tang (2021), reveals the potential of addiction to the blind box.

*Table 3* shows the results of the OLS estimation after the controls are introduced. Overall, the effect of key variables holds. To be specific, in contrast to newcomers who haven’t encounter the mechanism prior to their first purchase on blind boxes, the experience of investing in other types of entertainment which applies the blind-box mechanism can make consumers save 12900 yuan per year on blind boxes if they are risk-neutral, with other conditions keep the same. This result is in line with the study of Menkhoff et al. (2006), who claims that experience could increase the awareness of true volatility and reduce risk-taking behaviour.

Table 3. The OLS estimation of risk attitude and blind-box consumption with controls

VARIABLES	(1) Model 1
Risk premium:	
Level 2	4.592 (12.65)
Level 3	7.412 (11.47)
Level 4	-121.3*** (40.04)
Level 5	-117.4*** (41.63)
Level 6	-119.8*** (39.47)
Level 7	-121.0*** (41.46)
Level 8	-115.5*** (42.99)
Level 9	-115.9*** (40.50)
Experience	-129.0*** (38.43)
Risk premium*Experience:	
Level 5*Experience	141.0*** (41.92)
Level 6*Experience	123.4*** (39.64)
Level 7*Experience	129.8*** (41.67)
Level 8*Experience	120.6*** (41.69)
Level 9*Experience	125.4*** (40.39)
Age	1.380 (1.376)
Gender (Female)	-27.41 (20.36)
Disposable income	5.029 (9.010)
Place of Residence dummy:	
region = Shanghai	5.900 (8.946)
Constant	112.3** (51.31)

Observations	72
R-squared	0.451

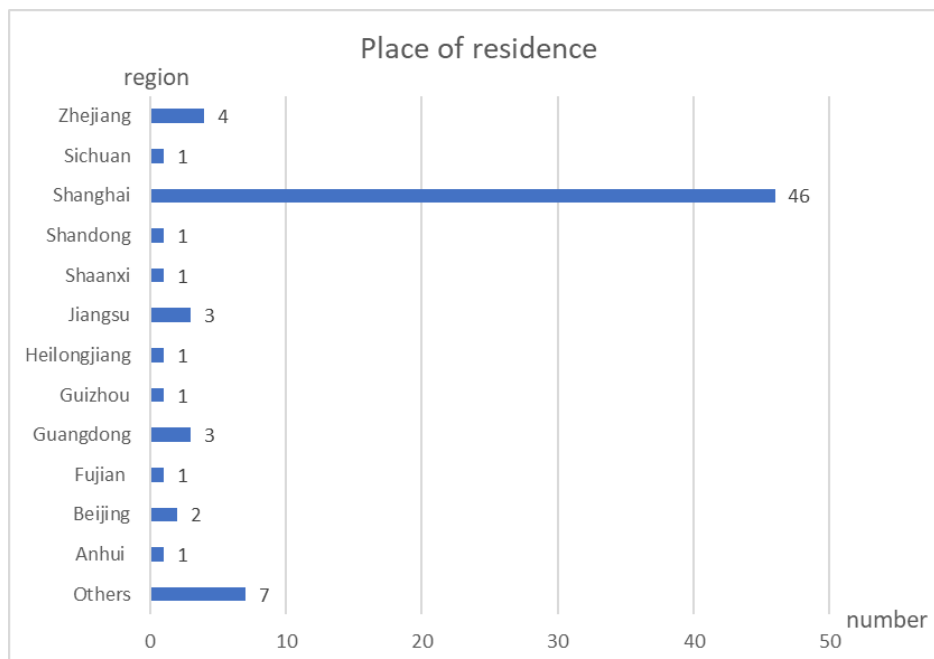
Robust standard errors in parentheses

\*\*\* p<0.01, \*\* p<0.05, \* p<0.1

However, when the risk premium is nonzero, the effect of experience becomes ambiguous. The coefficient of the interaction term suggests that compared with relatively the most risk-seeking respondents, as their risk premium increases by one level from level 4 to level 9, being experienced will increase the consumption of blind boxes of an by 14100, 12340, 12980, 12060, and 12540 yuan respectively in the last 12 months, *ceteris paribus*.

Therefore, though the result of risk premium level seems to prove that being more risk-averse will make people invest less money on blind boxes, which fits the theoretical hypothesis, the experience could flatten the influence of risk attitude. On one side, since experience can provide a more comprehensive understanding of the market, it helps the risk-seeking consumer stop overinvest, as well as avoids the risk-averse consumer underinvest. On the other side, experience may trigger the “Skinner box” mechanism, which lead to addiction to blind box. Such ambiguity is also in line with the contradicted claims in the previous literature.

Figure 3. The distribution of the place of residence in the sample



As illustrated in *Figure 3*, though 12 different provinces or municipalities are involved, most of the respondents are concentrated in Shanghai. Among the 72 effective respondents, 46 of them choose Shanghai as their current place of residence. Hence, the place of residence control is converted into a dummy variable, distinguishes whether the region of the subject is Shanghai or not.

By adding the demographic controls, the R square increased from 0.345 to 0.451, which indicates that those demographic variates can explain some of the variation of blind box consumption. However, none of the results are statistically significant. Hence, more discussion based on those internal factors is going to be conducted in the next section.

## 5. Discussion

### 5.1 Unbiasedness of the model

*Table 4. The variation inflation factor of explanatory variables*

VARIABLES	(1) VIF	(2) 1/VIF
Risk premium:		
Level 2	1.36	0.829680
Level 3	1.18	0.846626
Level 4	1.37	0.732064
Level 5	2.30	0.435004
Level 6	2.15	0.466122
Level 7	1.85	0.539274
Level 8	1.85	0.539358
Level 9	2.29	0.436935
Experience	1.31	0.766197
Age	1.66	0.603024
Gender (Female)	1.06	0.942404
Disposable income	1.48	0.673560
Place of Residence (Shanghai)	1.27	0.790406
Mean VIF	1.61	

The econometric analysis is based on data collected from a random experiment. Hence, the random sampling assumption and the zero conditional mean assumption

hold among this sample.

Another reason of biased results is multicollinearity. In order to avoid such noises, a correlation check is conducted. Results are shown in *Table 4*.

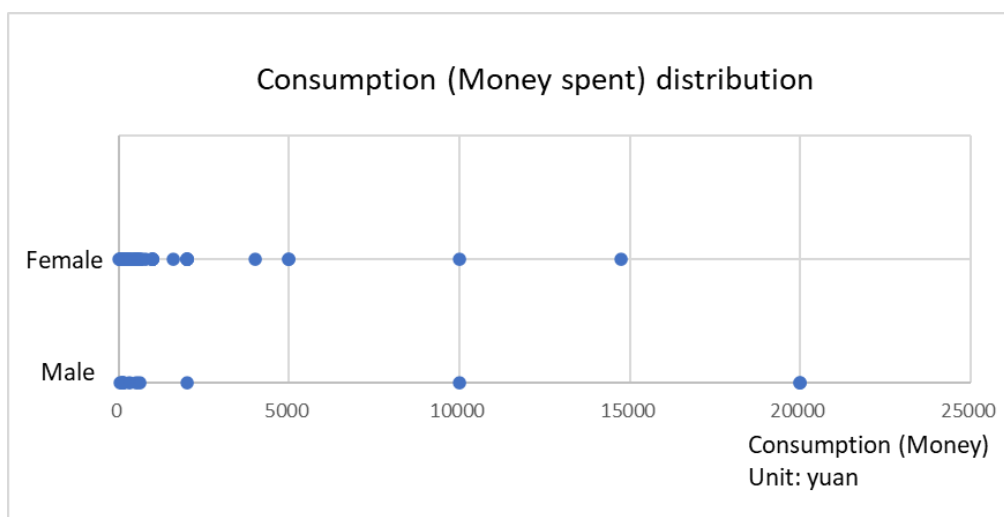
Since none of the variance inflation factor is higher than 10 and none of the tolerance level is lower than 0.1, the degree of collinearity is not a significant threat to the unbiasedness of the coefficient.

## 5.2 Sample representativeness

As mentioned in the literature review, the market leader Pop Mart has a clear market orientation towards specific gender and age groups. Schubert et al. (1999) suggest that gender-specific risk behaviour is not significantly related to gender. But the study of Menkhoff et al. (2006) proves female fund managers are more risk-averse than their male peers. Given the conflicting findings of past studies and the fact that these studies were not specific to blind box consumption, this thesis therefore further tests the effect of gender on blind box consumption to resolve the conflicting findings mentioned above.

### 5.2.1 Gender differences

*Figure 4. The distribution of the blind-box consumption, classified by gender*



Unfortunately, the gender distribution is not balanced among the sample. Among the 72 effective responses, only 12 of them are male, while female samples are 5 times

to it. Besides, as shown in *Figure 4*, the distribution of the blind-box consumption in males is more dispersive, and the extreme value is bigger than which in females. Hence, to conduct a detailed analysis on the gender differences of blind-box consumption, this sample is lack representativeness.

### 5.2.2 Age differences

Column 2 in *Table 5* lists the results when an age indicator is taking into considerations. As shown in *Figure 1* in Section 3.2, 26 years old is the mode among the sample. Meanwhile, the cumulative distribution is 51% for subjects under 26 years old. Hence, 26 years old is chosen as the benchmark. As the coefficients suggest, the effect of risk premium and experience on blind-box consumption for subjects no less than 26 years old is significantly different from those who are younger. The coefficient of the age indicator suggests that being elder will have a positive effect on blind-box consumption.

However, as for the interaction between the age indicator, risk premium level and experience, results are omitted since the sample are not adequately diverse to distributed on both sides of the age benchmark for different risk premium level and experience level. Hence, to study the effect of age, the sample is divided into 2 age groups by the age benchmark, which is 26 years old. As shown in Column 3 and Column 4, the coefficients of explanatory variables are still statistically significant for the elder group, while no longer convincing among the subjects who are less than 26 years old. The same trend also stands out when comparing the R square. As 75.3% of the variation in the blind box consumption can be explained by the chosen explanatory variables among subjects no less than 26 years old, same indicator drops to 30.1% for the younger generation.

Table 5. The results of OLS estimation on age indicator and subgroups

VARIABLES	(1) Model 1	(2) I (age $\geq$ 26)	(3) age < 26	(4) age $\geq$ 26
Risk premium:				
Level 2	4.592 (12.65)	-6.490 (5.255)	3.921 (8.462)	
Level 3	7.412 (11.47)	-2.290 (5.255)	5.014 (6.013)	
Level 4	-121.3*** (40.04)	-76.74** (31.90)	12.12 (8.280)	-112.8*** (26.31)
Level 5	-117.4*** (41.63)	-72.02** (32.29)	7.935 (7.636)	3.469 (28.03)
Level 6	-119.8*** (39.47)	-74.29*** (27.47)	-0.0368 (4.852)	-98.90*** (29.83)
Level 7	-121.0*** (41.46)	-74.80** (31.96)	10.26 (8.812)	3.448 (29.07)
Level 8	-115.5*** (42.99)	-72.80** (31.98)	20.03 (15.41)	
Level 9	-115.9*** (40.50)	-76.60** (31.96)	5.357 (7.059)	-88.64*** (31.29)
Experience	-129.0*** (38.43)	-78.15** (31.76)	8.523 (7.015)	-92.75*** (13.66)
Risk premium*Experience:				
Level 5*Experience	141.0*** (41.92)	96.33** (37.17)	18.65 (23.38)	
Level 6*Experience	123.4*** (39.64)	72.29** (27.11)		69.85*** (20.90)
Level 7*Experience	129.8*** (41.67)	82.01** (31.92)	1.994 (6.668)	
Level 8*Experience	120.6*** (41.69)	84.28** (33.49)	2.351 (14.43)	
Level 9*Experience	125.4*** (40.39)	80.81** (31.55)		77.09*** (23.96)
Age	1.380 (1.376)		3.107 (3.207)	-0.752 (2.370)
Gender (Female)	-27.41 (20.36)	9.566 (8.705)	8.633 (8.774)	-79.17** (36.25)
Disposable income	5.029 (9.010)	4.193 (4.841)	-0.919 (5.788)	
Place of Residence dummy:				
Shanghai	5.900 (8.946)	8.132 (8.529)	5.442 (7.093)	-5.561 (14.06)
I (age $\geq$ 26)		125.0** (49.60)		



Risk premium*I (age $\geq$ 26):				
Level 4*I (age $\geq$ 26)		-33.46		
		(26.19)		
Level 5*I (age $\geq$ 26)		-14.43		
		(28.12)		
Level 6*I (age $\geq$ 26)		-21.01		
		(14.93)		
Level 7*I (age $\geq$ 26)		3.346		
		(22.11)		
Level 8*I (age $\geq$ 26)				
Level 9*I (age $\geq$ 26)		-9.202		
		(10.14)		
Experience*I (age $\geq$ 26)		-17.66		
		(18.18)		
Gender*I (age $\geq$ 26)		-88.56**		
		(38.58)		
Place of Residence dummy*I:		-13.53		
		(17.07)		
Constant	112.3**	63.05*	-90.55	216.1***
	(51.31)	(34.79)	(86.92)	(60.97)
Observations	72	72	37	35
R-squared	0.451	0.619	0.224	0.694

Notes:  $I (age \geq 26)$  denotes the age indicator

Robust standard errors in parentheses

\*\*\*  $p < 0.01$ , \*\*  $p < 0.05$ , \*  $p < 0.1$

### 5.2.3 Regional differences

As mentioned in Section 3.2 and Section 4, most of the respondents are living in Shanghai. Therefore, to conduct a further analysis of regional differences, this sample is not adequately diverse. Besides, the concentration on specific region among the sample could raise further biases.

According to the annual financial statement of Pop Mart for the year 2020 (2021), though the online distributor is growing rapidly, the local retail store still takes the biggest portion of the total revenue. This could be explained by the representativeness heuristic, which is mentioned in Section 2.3. Those consumers who believe in superstitions need to go to the site to perform their formalities. Meanwhile, among the

187 retail stores, 81 of them are located in the so-called “first-tier cities”, which are Beijing, Shanghai, Guangzhou and Shenzhen. Hence, people from those cities have higher exposure to the information relates to blind boxes. Those external factors could interfere with the effects of the internal factor from the consumer, which are evaluated in this model. Hence, the scale of the effect of risk attitude and other explanatory variables on the investment of blind box might be exaggerated in this model.

### 5.3 Alternative measurements

As mentioned before, there is a problematic response that fills in the same answer for the money spent and amount purchased of blind boxes in the last 12 months. Such a phenomenon raises the worry of the accuracy of the answers to the same question. Therefore, only the money spent is used as the dependent variable in the statistical analysis.

Despite the potential errors, an extra OLS estimation is utilised, while the relevant results are listed in *Table 6*. Instead of using the money spent on the blind box in the last 12 months as the dependent variable, Model 2 use the amount of blind box that the subject purchased in the same period. As the results in Column 2 suggests, the two models are consistent in their findings. Whether blind box investment is measured in terms of money or quantity, both the risk premium level and its interaction with experience are proved to be significant. The high level of agreement between the two models on other results confirms the consistency and generalisability of the model designed for this study.

Due to the worry of the privacy awareness of Chinese people, the questionnaire only set the national average level as the benchmark to classify the disposable income level of the respondents. Even in this case, there are 10 respondents out of the 99 who finished the questionnaire but refuse to reveal their income level. Within the 72 effective respondents, only 8 people identify their monthly average disposable income as lower than the national average level. Account for the existence of regional differences, a more detailed classification is necessary for further research.

Besides, the classification of experience could also be more detailed. As mentioned

in Section 2.4, the experience could either encourage those who are addicted to invest more or make those who are rational stop overinvesting. Instead of the binary variable which is adopted in this study, a categorical variable with more scales may show a nonlinear relationship between the experience and the consumption of blind boxes.

*Table 6. The results of OLS estimation with amount purchased as dependent variable*

VARIABLES	(1) Model 1	(2) Model 2
Risk premium:		
Level 2	4.592 (12.65)	29.68 (26.46)
Level 3	7.412 (11.47)	33.09 (25.31)
Level 4	-121.3*** (40.04)	-156.6*** (31.79)
Level 5	-117.4*** (41.63)	-190.8*** (39.00)
Level 6	-119.8*** (39.47)	-122.6*** (25.90)
Level 7	-121.0*** (41.46)	-136.7*** (22.60)
Level 8	-115.5*** (42.99)	-128.2*** (25.97)
Level 9	-115.9*** (40.50)	-81.53 (62.99)
Experience	-129.0*** (38.43)	-167.0*** (16.27)
Risk premium*Experience:		
Level 5*Experience	141.0*** (41.92)	241.4*** (54.61)
Level 6*Experience	123.4*** (39.64)	147.0*** (24.51)
Level 7*Experience	129.8*** (41.67)	148.3*** (27.37)
Level 8*Experience	120.6*** (41.69)	371.2** (172.8)
Level 9*Experience	125.4*** (40.39)	112.8* (61.82)
Age	1.380 (1.376)	2.592 (1.567)
Gender (Female)	-27.41 (20.36)	-44.34* (25.97)

Disposable income	5.029 (9.010)	-51.15 (44.80)
Place of Residence dummy:		
Region = Shanghai	5.900 (8.946)	5.391 (13.86)
Constant	112.3** (51.31)	174.0*** (54.61)
Observations	72	72
R-squared	0.451	0.476

Robust standard errors in parentheses

\*\*\* p<0.01, \*\* p<0.05, \* p<0.1

#### 5.4 Application and further analysis

This paper mainly focuses on the internal factors of consumers which may affect their investment in blind boxes. Unlike traditional gambling, the blind box is a more delicate business activity: after all, people are just trading toys under a specific marketing strategy. Most of the regulations which are proved to be effective in gambling are unenabled in the blind box industry due to the violation of the privacy of consumers and the equilibrium of the market economy. Therefore, the demand side is more crucial to prevent the blind box from brutal expanding and end up being a legal gambling industry, just like the general results highlight the importance of personal characteristics.

As the research of Gainbury, Tobias-Webb & Slonim (2018) suggests, setting personal account to record consumption history is a cost-effective behavioural economics approach. In practice, market leaders like Pop Mart provide the membership service, which could play a similar role. Like gambling, there is no universal standard of “overinvesting” in the consumption of blind boxes. Therefore, for consumers, the only standard that matters is the budget they set by themselves. Similar to the function that experience helps consumers get a better understanding of the market, the consumption history kept in the personal account could help consumers get a better understanding of themselves, hence, set their own affordable budget.

Apart from the general results which are mostly in line with previous literature and behavioural economics theory, further analyses on control variables provide some

enlightenments on regulating the industry. To be specific, the analysis on age suggests that the younger generation is less affected by internal factors like risk attitude and experience. Meanwhile, the regional difference stands out. Both results indicate that external factors need to be analysed.

This study focuses on the effects of risk attitudes, past consumption experiences and demographic information on respondents' blind box consumption. However, this study only used respondents' self-administered questionnaires to collect information on their consumption behaviour. Such a data collection method may not provide true insight into their psychological and risk attitudes towards blind box consumption. An effective way forward would be to observe respondents' blind box consumption decisions under different conditions through an experiment to obtain more accurate data on different decisions.

## **6. Conclusion**

This paper is inspired by the local heat of blind boxes and the deviation between the belief and practice, aiming at understanding the marketing mechanism of the blind box, hence, detecting the influence of risk attitude level on the consumption of blind boxes. Besides, by decomposing the behavioural insights behind the mechanism, the experience of the market is recognised as a determinant of the consumption of blind boxes. Apart from the direct effect, the emphasis is laid on whether the experience would enlarge or flatten the effect of risk attitude.

The econometric analysis is based on the data collected from blind box buyers in the Chinese market. With the consumption of blind boxes in the last 12 months measured by money spent as the dependent variable, an OLS estimation model is applied to the explanatory data including the risk attitude level, experience, and demographic data of the respondents. Demographic data such as age, gender, disposable income level, and place of residence are included as controls. After the statistical analysis of the effective sample, two pre-set hypotheses are checked out: for an inexperienced consumer, the more risk-averse he or she is, the less he or she will spend on blind boxes; when the consumer is risk-neutral, being experienced means he or she is going to spend less on

blind boxes.

However, the interaction of experience and risk attitude indicates that the experience could flatten the influence of risk attitude. Therefore, the deviation between the belief and practice could take place if a consumer is risk-averse and experienced. Tests with the age indicator indicate that for younger generations who are less than 26 years old, those internal factors are no longer crucial to explain their consumption of blind boxes.

Restricted by the data, the results of this paper should be treated with caution. Among the effective sample, the aggregation of the place of residence and the lack of male respondents stands out, which may challenge the robustness of the results. To prove the universality of the results, a bigger sample that includes more data from males and places other than Shanghai is necessary. Nevertheless, the current sample indicates the regional difference, which will need further investigation.

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## Appendix:

### 1. The full text of the questionnaire

Dear participants, thank you for taking part in this survey. This is a part of the research for my master thesis at Erasmus University Rotterdam. The survey takes approximately 5 minutes. All data provided will be only used for academic purpose and your anonymity will be respected.

亲爱的参与者，感谢您参与本次问卷调查。本问卷是为了我在鹿特丹伊拉斯姆斯大学的硕士毕业论文而设计的。完成所有问题大约需要耽误您 5 分钟左右的时间。所有的数据只会被用于学术用途，您的匿名性将得到最大的尊重。

If there is any questions or ambiguities, please contact my via email : [544249yl@student.eur.nl](mailto:544249yl@student.eur.nl).

如果您有其他的疑虑，请发送邮件至我的邮箱：[544249yl@student.eur.nl](mailto:544249yl@student.eur.nl)

Ying Le

乐颖

1. Consider your friend has sent you a lottery ticket as a present. There is a 40% chance you are going to win a prize worth 50 yuan. Otherwise, you can get a 20-yuan refund from the organiser. Meanwhile, a third party is willing to buy this ticket at a fixed price. May I ask if the price is lower than which of the following amounts are you unwilling to sell this lottery ticket?

假设您的一位朋友送了您一张彩票。有 40% 的概率您会中奖得到 50 元。如果没有中奖，您也可以得到 20 元的退款。此时第三方愿意出价购买这张彩票。请问当价格低于以下哪一个金额时你不愿意出售这张彩票？

Option A: keep the ticket 保留这张彩票	Option B: sell the ticket 出售这张彩票
40% of getting 50 yuan; 60% of getting a 20-yuan refund 有 40% 的概率中奖得到 50 元 60% 的概率得到 20 元退款	Selling at 50 yuan 以 50 元的价格出售
	47 yuan 以 47 元的价格出售
	44 yuan 以 44 元的价格出售
	41 yuan 以 41 元的价格出售
	38 yuan 以 38 元的价格出售
	35 yuan 以 35 元的价格出售
	32 yuan 以 32 元的价格出售
	29 yuan 以 29 元的价格出售
	26 yuan 以 26 元的价格出售
	23 yuan 以 23 元的价格出售
20 yuan 以 20 元的价格出售	

\* In this survey, blind box only refers to pure designers toy without other commodity as shown in the following picture. Commodity blind box such as air ticket blind box, food blind box is not included.

在这个问卷中，盲盒仅指纯粹的、不包含其他附加商品的潮玩（如图所示）。商品盲盒如机票盲盒、食物盲盒等并不包括其中。



2. Could you please write down your total consumption on blind box in the last 12 months (money spend)?

请写下您在过去 12 个月内在盲盒上的总消费金额

3. Could you please write down your total consumption on blind box in the last 12 months (quantity)?

请写下您在过去 12 个月内购买盲盒的数量

4. Before your first purchase of designers' toy blind box, have you ever encountered with other forms of entertainment which also include the blind-box mechanism, such as gachapon, gacha-games, fukubukuro, etc.?

在您第一次购买潮玩盲盒之前，您是否有过接触其他类盲盒机制的娱乐活动（如扭蛋、抽卡游戏、福袋等）的经历？

5. Have you ever spent money on these entertainments? (Only appears if the respondent chooses "yes" in Q4)

您曾经在这些娱乐活动中有过金钱消费吗？（此问题只出现于参与者在 Q4 选择“是”之后）

6. Your age is:

您的年龄是：

7. Your gender is:

您的性别是：

8. Your disposable income in the last 12 months is (please consider the monthly average)

您过去 12 个月的可支配收入是（请参考每月平均水平）：

a. less than 2682 yuan 低于 2682 元

b. higher or equal to 2682 yuan 高于或等于 2682 元

c. I'd rather not disclose my information 我不愿意透露相关信息

9. Your current place of residence (if you have other place of residence in the last 12 months, please specify):

您现在的常住地是（如果在过去 12 个月有其他常住地，请注明）：

Thank you for your support!

感谢您的帮助！