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The Role of Social Norms in Zero Price effects

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Abstract: It has been proposed that social norms play a role in zero price effects on consumption. In Study 1, we use a norm-elicitation experiment to directly measure the effects on norms of consumption, demonstrating that the social appropriateness of consuming high quantities is significantly lower when goods are offered for free than when they are sold at 1 cent. In Study 2, we employ a natural field experiment to put into practice the scenarios from Study 1 and measure actual consumption behavior. Results depend upon how we measure zero price effects, but offer some support for findings of previous research that zero pricing increases the likelihood of an individual consuming while reducing the amount taken by those who do consume. Overall, the evidence suggests high consumption of free goods is prevented by its social inappropriateness, potentially helping to explain for the inconsistent evidence on the direction of zero price effects in previous studies. Conditional logit estimations suggest social norms drive consumption decisions for free goods, while material benefits are the dominant consideration when goods are positively priced.

Keywords: social norms; social appropriateness; zero price effects; natural field experiment;

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norm-elicitation task

1. Introduction

Free things can taste better. The groundbreaking research of Shampanier et al. (2007), and following works, have identified a tendency for people to prefer a zero-priced option over a positively priced one, even if the two options have the same cost-benefit difference. This discontinuity in demand around the price of zero is often labelled the "zero price effect". In everyday life, free giveaways have gained prevalence as a marketing tool because of their potential to increase purchase intentions and actual sales (Beltramini, 2000; Sun et al., 2020). As an example, consider the digital service industry's freemium business model, in which an app developer provides a free trial version with restricted features to increase users' intention to purchase the paid premium version with full features (Hüttel et al., 2018; Niemand et al., 2019; Rietveld, 2018). In the public sector, governments launch programs involving free giveaways with the aim of influencing people's behavior and increasing the welfare of society. Examples include free nicotine patches to discourage smoking (Cummings et al., 2006) and free books to promote reading habits (de Bondt et al., 2020). In response to Covid-19, governments around the world have provided free vaccines to reduce deaths from the disease.

However, free things might not always taste better. Sometimes providing products for free has no significant influence on demand (Ching et al., 2018; Driouchi et al., 2011). In fact, zero pricing has even been found to adversely affect demand in some contexts (Ariely et al., 2018; Cai et al., 2018). Overall, evidence on the direction, as well as the extent, of zero price effect is inconsistent, with results differing across different types of good (Ching et al., 2022; Hossain & Saini, 2015).

A possible explanation for some of this inconsistency involves social norms, the unwritten rules generally accepted and followed by members of a society (Bicchieri, 2006). It is well established that human actions are guided by social norms: evidence found across a range of disciplines suggests they indeed influence behaviors across a multitude of domains, including for instance alcohol consumption (Dempsey et al., 2018), division of surplus (Burke & Young, 2011), and recycling (Anderson & Dunning, 2014).

A pioneering investigation of the relationship between social norms and the price of zero was provided by Ariely et al. (2018) (hereafter, AGH). Their key insight is that zero pricing, in interaction with social norms, may affect not only the probability of consumption, but also the amount each consumer takes. In their experiments, they observed that when truffles or candies were offered for free, rather than for 1 cent or in exchange for an effort-based non-monetary cost, there was an overall *decrease* in total demand because, while there were more takers under free pricing, these takers mostly consumed a relatively low amount, usually one unit. This second effect represents an important discovery in the zero price effect literature, and could not have been identified by many of the earlier studies, which by design limited consumption to a maximum of one unit.

AGH proposed that when there is no price, the social norms that govern social relationships instead of those governing market transactions dominate the decision-making process; the price of zero thus lowers overall consumption, because according to the norms governing social relationships the appropriate consumption amount is only one or two units per person. To test their proposal, AGH used a priming method. They separately primed these two

types of social norms, using verbal information or descrambling tasks, and observed subsequent consumption behavior. They found, consistent with their argument, that the zero price effect on the amount taken by takers was more negative with social priming than with no priming or monetary priming.

In this study, we build upon AGH's work, and take a step further by directly estimating the connections between free pricing, social norms and actual consumption behaviour. A key element of our strategy involves, rather than simply inferring norms from behavior, quantitatively measuring the norms themselves. To do this, we implemented the norm-elicitation method introduced by Krupka & Weber (2013), presenting subjects with hypothetical scenarios in which goods were sold either at the price of zero or at a marginally positive price, and tasking them with assessing, in an incentive-compatible mechanism, the social appropriateness of different levels of consumption in these scenarios. Then, we conducted a natural field experiment which put the hypothetical scenarios in the norm-elicitation task into reality, and observed actual consumption behavior. In so doing, our aims are to estimate zero price effects on social norms of consumption and on consumption behavior itself, and to explore whether changes across price conditions in consumption can be explained the changes brought about in social norms. We furthermore examine how these effects vary across different product contexts: low-value vs. high-value goods, abundant vs. scarce goods, and non-socially-beneficial vs. socially-beneficial goods.

Our findings generally concur with AGH's ideas. The norm-elicitation task shows that zero pricing does significantly reduce the social appropriateness of high levels of consumption. As

consumption increases, social appropriateness declines faster when the good is free than when it is priced at 1 cent. The sensitivity that social norms show to the tiniest of possible increases in the cost of purchasing is quite remarkable, supporting the idea that zero is a unique price with special characteristics (Shampanier et al., 2007). However, there is little evidence, in opposition to our hypotheses, that these effects on norms are dependent on the value, scarcity, or social beneficialness of the products being traded.

The natural field experiment yields effects of zero pricing that are often consistent with AGH's findings, and with the effects we observe on social norms. In measuring zero price effects on consumption behavior, we face a challenge in that the natural approach of simply handing out free goods will result in the transaction cost of consumption being uncontrolled between the zero price and 1 cent conditions, thereby potentially giving rise to an alternative, rational reason (unrelated to social norms) for zero pricing to affect consumption. Therefore, our field experiment runs two versions of the zero price condition – one in which goods are handed out for free (therefore leaving the transaction cost uncontrolled), and the other which requires consumers to first pay for the good and then receive an immediate refund (which controls the transaction cost, but might have other adverse effects on consumption, for instance by arousing customers' suspicion). We regard these two treatments as providing estimates of the upper and lower bounds of zero price effects.[2]

[2] The issue of transaction costs in zero price effects has been dealt with multiple ways in previous research. For instance, Shampanier et al. (2007) and AGH have attempted to show that transaction costs do not fully explain zero price effects using different experimental designs. In some cases, subjects have been asked to make hypothetical choices without any transaction cost. In others, the cost of chocolates has been added to the bills of consumers who were already making a purchase. Therefore, the transaction cost remains constant in all price conditions

102 The certainty with which we can draw conclusions about these behavioral effects is limited
103 by the quite marked difference we observe between these two treatments. However, we find –
104 broadly in line with AGH – that zero pricing in many cases increases the percentage of takers
105 (n) and almost always decreases the quantity taken by takers ($q|q > 0$). The direction of the
106 combined effect varies, but more often goes in the direction of reducing total demand. These
107 results reflect our findings on social norms, suggesting high consumption under zero pricing is
108 indeed constrained by its social inappropriateness. While we find some variation in the
109 behavioral effects between different product contexts, these differences tend not to be robust
110 across both versions of our zero price condition; this is also consistent with the lack of strong
111 evidence for different zero price effects on the norms regulating consumption for different types
112 of product.

113 Finally, we use conditional logit regressions to model consumption decisions as a function
114 of the pursuit of material gain and social norm compliance. This analysis suggests that, when
115 products are given away purely for free without requiring any transaction effort by the consumer,
116 considerations about social appropriateness dominate the decision over how many units they
117 take, while considerations about material gains are insignificant. However, when a positive
118 price is imposed, the material benefit becomes the dominant influence. This suggests that not
119 only does zero pricing change the content of normative prescriptions over consumption, it also

(including zero price) for all consumption levels (including taking nothing). Their results show that zero price effects still exist when transaction costs are held constant across price conditions. However, whether and how much transaction costs affect the size of zero price effects have not been empirically addressed. We therefore considered it necessary for our experimental design to allow for the possibility of their presence. The aforementioned elimination methods from previous studies would not have been applicable in our field experiment, in which we wanted to observe real consumption decisions by people not already in the process of making purchases. Hence, we came out with an alternative approach to the problem.

increases' consumers' willingness to comply with them.

The study contributes to the literature regarding the mechanisms through which zero pricing affects demand, improving our understanding of a phenomenon for which existing studies have produced results in opposing directions. We complement and extend the work of AGH, in particular through our use of a direct norm-measurement technique, which has recently been gaining popularity in many areas of research (Gächter et al., 2013; Kimbrough & Vostroknutov, 2016; Lane et al., 2023), but has not been applied to zero price effects prior to the current study. Another advantage is that we investigate whether different product characteristics make a difference to the results. A further innovation is that our field experiment introduces a method to control the transaction cost across zero and positive price conditions, therein providing a novel way of addressing an empirical challenge to the measurement of zero price effects.

The rest of the paper has the following structure. The next section outlines concepts based on related works, proposes our hypotheses, and previews how they will be tested. Section 3 and 4 report the two experiments we conducted to study how social appropriateness and actual behaviors are affected by zero pricing under different situations. Both sections describe the methods and results in detail. Section 5 explores whether social norms and actual taking behaviors relate to each other. Finally, Section 6 summarizes and discusses the findings.

2. Concepts and Hypotheses

Classic economic theory assumes that a rational person should consume up to the quantity

limit or until the marginal benefit of consumption reaches the marginal cost. With a growing body of literature reporting behaviors that differ from what classic economic theory expects, researchers have re-diagnosed "irrational" behaviors by incorporating social appropriateness in addition to material benefits into the decision-making model (Kato et al., 2020). In studying the relationship between social norms and zero price effects, AGH suggest that pricing a product at zero changes the social norms regulating its consumption, which in turn influence actual consumption decisions. In accordance with this explanation, under zero pricing, social norms governing social relationships take precedence and steer away people's behavior from the selfishness of *homo economicus*.

Following Krupka & Weber (2013), the individual i's utility function of demand q_i can be written as:

$$U_i(q_i) = \begin{cases} \beta\pi_t(q_i) + \gamma N_t(q_i) + \alpha(free = 1), q_i > 0 \\ \beta\pi_t(0) + \gamma N_t(0), \qquad q_i = 0 \end{cases} \quad (1)$$

Where $\pi_t(q_i)$ is the material benefit, as a function of quantity q_i, in treatment t. That is, it is the consumer surplus gained from consumption, which is equal to the quantity q_i multiplied by the difference between the individual's willingness to pay and the price they actually pay for each unit, $q_i \times (WTP - price)$. $N_t(q_i)$ is the appropriateness of taking q_i in treatment t. This is based upon the collective agreement of society, with more appropriate actions taking higher values for $N_t(q_i)$. β and γ are the weights of the two components, representing the desire for material benefits and for complying with social norms. To account for the special affect towards zero price (Shampanier et al., 2007), we extend the function under zero price with an additional

parameter α, wherein those who consume any positive quantity of the good receive additional utility. In line with established theories, all three parameters should be positive.

At the individual level, switching from the price of 1 cent to zero, the change in $\pi_t(q_i)$ is arbitrarily small. Any effects of zero pricing on the utility maximizing choice should therefore derive from its effects on the utility gained from complying with social norms and/or the positive feeling triggered by receiving free things. At the aggregate level, the market demand is the sum of q_i taken by each individual, $\sum_{i=1}^{M} q_i$, where M is the total number of individuals in the market; or, equivalently, the sum of q_i among all takers, $\sum_{i=1}^{m} q_i \,|q_i > 0$, where m refers to the number of individuals who take at least one unit. Therefore, one can decompose the overall effect of zero pricing into the effect on the percentage of takers, $n = m/M * 100\%$, and the effect on the amount taken by takers, $q|q > 0$. The two types of effects together determine the direction and extent of the change in total demand when price is reduced from marginally positive to zero. One possible explanation for some of the mixed findings in the literature is that reducing price to zero increases n but decreases the average amount taken by takers, $\bar{q}|q > 0$, making the sign of the overall effect ambiguous.

2.1 Awakening social norms

According to AGH, when items are offered for the price of zero, social norms of fairness and reciprocity should be evoked. Consuming a high quantity (i.e. more than one unit) of zero-priced items may be considered less socially appropriate for at least two reasons. For one thing, it may reduce other people's chance of getting the zero-priced items; for another, it can exploit the provider's offer of generosity. When items are sold at a low but positive price, consumers

may perceive it as a bargain. Though buying excessively in this circumstance may also appear to be greedy, we hypothesize that the norms of the market will take precedence over the norms of social activity, making taking any amount exceeding one unit more acceptable than the same action under the zero price condition. We predict that, under the influence of norms of social activity, social appropriateness will drop as quantity consumed increases when the price is zero, whereas norms of market activity will prescribe that all consumption behaviors are roughly equally socially appropriate when the price is positive.

H1: *(negative zero price effect on social appropriateness)* Taking any quantity $q_i > 1$ for the price of zero is less appropriate than taking the same quantity at the price of 1 cent per unit.

We hypothesize that the rate at which appropriateness decreases in quantity may vary across item contexts. Based on Fiske's social relations theory (Fiske, 1992), offering zero-priced goods starts reciprocal relationships in which receivers take note of the kindness and pay back or pass on equal kindness (Ariely et al., 2018). When zero-priced goods are of higher value, this may be interpreted as greater kindness and negatively influence the social appropriateness of excessive consumption. Meanwhile, such changes in kindness are not very relevant when the social norms of the market are dominant, under the 1-cent condition, because reciprocity has not been triggered and thus we expect changes in the value of the product to hardly have an impact on the norm function in this case. Consequently, we hypothesize that higher product value further increases the difference in appropriateness of taking behavior between the zero price and the 1-cent conditions.

H1a: *(more negative zero price effect on social appropriateness in a high-value context)*

For consumption of any quantity $q_i > 1$, the price change from 1 cent to zero causes a greater decline in social appropriateness when the items are of higher value.

The situation where the available quantity of the zero-priced goods is limited is analogous to a common pool resource dilemma (Farrow et al., 2017; Kimbrough & Vostroknutov, 2015). Overconsumption of scarce resources may result in negative externalities, by lowering others' chances of consumption. When zero-priced items are scarce, it should be less socially appropriate to consume the same quantity than when they are abundant, because overconsumption in the scarce context limits the number of potential receivers. Under the 1-cent condition where the social norms of the market are in play, we expect that people care less about these negative externalities (Falk & Szech, 2013). With the appropriateness of high consumption lowered by scarcity under the zero price condition but barely affected by it under the 1-cent condition, the effect of zero pricing on social appropriateness is hypothesized to become more negative in a scarce context.

H1b: *(more negative zero price effect on social appropriateness in a scarce context)* For consumption of any quantity $q_i > 1$, the price change from 1 cent to zero causes a greater decline in social appropriateness when the items are scarcer.

The public sector often provides socially-beneficial goods to increase social welfare. For example, free condoms are distributed to prevent sexually transmitted diseases (Renaud et al., 2009); residents periodically receive free garbage bags that help for recycling (Volschenk et al., 2021). A sense of social responsibility may arise from receiving socially-beneficial goods for free because the price of zero signals to the public that underconsumption is socially

inappropriate, while this kind of signaling may not work in a non-socially-beneficial context. For example, during the Covid-19 pandemic, people may have perceived that taking a free PCR test would potentially benefit their whole society while skipping one could put it at risk. This would suggest that taking nothing is regarded as more inappropriate than taking one unit of a socially-beneficial free product. Though overconsumption of these zero-priced goods may also be undesirable, the society's wish to avoid their underconsumption may mean that an individual taking a large quantity of socially-beneficial items is considered more acceptable than if they consumed excessively for selfish purposes only. With a positive price, however, social norms of the market may bury any considerations about social responsibility, leaving the norm function under the 1-cent condition unaffected by the item being socially-beneficial or not. Taking this into account, we hypothesize that the negative effect of zero pricing on socially appropriateness will soften for socially-beneficial products.

H1c: (*less negative zero price effect on social appropriateness in a socially-beneficial context)* For any quantity $q_i > 1$, the price change from 1 cent to zero causes a lesser decline in social appropriateness when the items are more socially-beneficial.

2.2 Utility maximization behavior

We assume an individual chooses the consumption level q^* to maximize his/her utility, within the constraints of the quantity limit. Based on the equation (1), the utility-maximizing problem can be specified as:

$$maxU_i^1(q_i) = \begin{cases} \beta q_i(WTP - 0.01) + \gamma N^1(q_i), & q_i > 0 \\ \gamma N^1(0), & q_i = 0 \end{cases} \qquad (2)\ 1-\text{cent condition}$$

$$maxU_i^0(q_i) = \begin{cases} \beta q_i WTP + \gamma N^0(q_i) + \alpha, & q_i > 0 \\ \gamma N^0(0), & q_i = 0 \end{cases} \quad \text{(3) zero price condition}$$

For low consumption levels such as zero or one unit, the social appropriateness is not generally expected to differ between the zero price and 1-cent condition. Due to the heterogeneity in preferences for any given product and the potential existence of transaction costs (for example, the time cost to bother getting the product), the material benefit of consumption can be negative for some people, thereby making zero a possible consumption level. The probability of taking nothing is then expected to be lower under the zero price condition because marginal consumers can switch from this action to consume one unit and gain the emotional benefit from α, which does not exist under the 1-cent condition, to offset the negative material benefit, with no cost in terms of social inappropriateness. Therefore, consistent with existing empirical evidence of a positive zero price effect on the number of takers of a product (Baumbach, 2016; Hossain & Saini, 2015; Shampanier et al., 2007), we hypothesize:

H2: *(positive zero price effect on n)* The price change from 1 cent to zero causes an increase in the percentage of takers, for all types of good.

We predict that, on average, a lower quantity will be taken by those who do take something when the price is reduced from 1 cent to zero. With the material benefit increasing in consumption at almost exactly the same rate under the two different price conditions, the maximum utility is hypothesized to be reached sooner, on average, in the zero price condition because we believe social appropriateness decreases in consumption more sharply under such a condition than under the 1-cent condition. For instance, there may be many individuals whose

utility maximizing consumption level is 1 unit under zero pricing, because they do not consider it worthwhile to incur the social disapproval of taking any more. Therefore, the utility-maximizing $q^*|q > 0$ should be greater, on average, when the price is 1 cent instead of zero.

H3: *(negative zero price effect on* $q|q > 0$*)* The price change from 1 cent to zero causes a decrease in the quantity taken by takers, for all types of goods.

The opposite directions of effects in **H2** and **H3** imply that the direction of the overall effect on market demand is ambiguous. As mentioned earlier in Section 1, most existing literature has looked at zero price effects only on the frequency of taking behavior. AGH observed a decrease in overall demand when switching from 1 cent to zero. However, since empirical evidence about the overall effect is scarce, we do not make a formal hypothesis about its direction in our study.

When the items are of higher value, we expect the percentage of takers to increase under both price conditions. In one of their experiments, AGH observed that every subject took at least one piece of truffle regardless of price condition, which aligns with intuition suggesting that taking one unit is socially appropriate under all circumstances. Therefore, consumption should take place as long as its material benefit is positive. With a higher value product, this is more likely to be the case. In short, we hypothesize that, in the high-value context, consumers perceive enough benefit from getting the good that it is worth the hassle of claiming it.

H2a: Under both price conditions, n is greater when the items are of higher value.

A high-value product provides a stronger incentive for individuals to increase demand. We

expect $q|q > 0$ becomes larger in both price conditions when the items offered are of higher value. However, we expect the difference in material benefit between the two conditions remains trivial while the difference in the social appropriateness term becomes larger (recall that the slope of the norm function is hypothesized to be flat in the 1-cent condition for all contexts, while it is hypothesized to decrease in consumption more sharply in the high-value than the low-value context when the price is zero and $q > 0$). We hypothesize that this will result in norms constraining the consumption of free goods more strongly when they are of higher value, entailing a greater disparity in $q|q > 0$ between the zero price and 1-cent conditions in the high-value than the low-value context.

H3a: *(more negative zero price effect on $q|q > 0$ in a high-value context)* The price change from 1 cent to zero causes a greater decrease in $q|q > 0$ when the items are of higher value.

The hypothesis about a more negative zero price effect on social appropriateness in the scarce context (**H1b**) implies that, at a given consumption level, the appropriateness gap between the 1-cent and zero price conditions should be wider in a scarce than in an abundant context. When the available units of the zero-priced items become scarce, people may be more afraid of being considered greedy. Following analogous logic to that above for **H3a**, we hypothesize that the utility-maximizing quantity $q^*|q > 0$ of free products is smaller when they are scarce, entailing a stronger zero price effect under this context. Note that we do not, however, hypothesize any effect of scarcity on n, as we expect taking one unit to remain very appropriate under this context.

H3b: *(more negative zero price effect on $q|q > 0$ in a scarce context)* The price change from 1 cent to zero causes a greater decrease in $q|q > 0$ when the items are scarcer.

People are expected to be more willing to take at least one unit in the socially-beneficial than in the non-socially-beneficial context, because it is likely that they realize that the society wishes to avoid underconsumption of socially-beneficial goods. As mentioned in section 2.1, we predict that, especially when the price is zero, taking nothing is more socially inappropriate in the context of socially-beneficial than non-socially-beneficial products. From this perspective, based on the expected context difference in the zero price effect on the appropriateness of taking zero or one unit, the number of takers is expected to increase when the products become socially-beneficial when the price is zero.

H2c: *(more positive zero price effect on n in socially-beneficial context)* The price change from 1 cent to zero causes a greater increase in n when the items are more socially-beneficial.

The hypothesized less negative zero price effect on the social appropriateness of high levels of consumption (**H1c**) would entail weaker normative constraints on taking large quantities of a good when it is socially-beneficial. We hypothesize this translating into a weaker zero price effect on the consumption of takers for more socially-beneficial goods.

H3c: *(less negative zero price effect on $q|q > 0$ in a socially-beneficial context)* The price change from 1 cent to zero causes a lesser decrease in $q|q > 0$ when the items are more socially-beneficial.

2.3 Overview of empirical approach

The hypotheses are tested through two experiments: an online experiment to measure how norms change, and a natural field experiment to observe how actual behavior changes, when price is changed from 1 cent to zero. First, to identify the social appropriateness associated with possible taking behaviors (including taking nothing) under different price conditions and different product contexts, we carry out a norm-elicitation experiment using the method developed by Krupka & Weber (2013). This approach is essentially a coordination game in which subjects rate the social appropriateness of an array of behaviors and are incentivized to coordinate with other subjects' answers. Through such a task, we are able to use shared perceptions of appropriateness to identify the social norms relating to different levels of consumption of free or positively priced goods, taking into account variation in the goods' value, scarcity, and social beneficialness. Secondly, the natural field experiment puts the scenarios described in the norm-eliciting experiment into reality. Both studies are done in China.

3. Study 1: Norm-elicitation task

3.1. Design and procedure

To measure zero price effect on social appropriateness and explore how it differs when the type of good (non-socially-beneficial vs. socially-beneficial), scarcity (abundant vs. scarce) and value (low value vs. high value) change, a full factorial design would involve 16 treatments. However, our interest lies in the effects of each of these three factors under fixed conditions, thus reducing the required number of treatments. We implemented benchmark treatments with abundant, low-value, non-socially-beneficial items (chocolates), sold for either 1 cent or free, and compared the benchmark difference between these two price conditions in the elicited

346 norms against the corresponding difference measured in each of three other contexts.
347 Specifically, we compare the zero price effect on the social appropriateness of consumption for
348 (1) low- versus high-value products (benchmark vs. abundant Godiva chocolates), (2) abundant
349 versus scarce contexts (benchmark vs. 10 available units of low-value chocolates), and (3) non-
350 socially-beneficial versus socially-beneficial products (benchmark vs. abundant medical
351 masks[3]). Therefore, 8 treatments are employed in a 2 (zero price, 1 cent) × 4 (abundant, low-
352 value, non-socially-beneficial items; abundant, high-value, non-socially-beneficial items;
353 scarce, low-value, non-socially-beneficial items; abundant, low-value, socially-beneficial items)
354 between-subject design (Table 1).

355 In this study, we elicit norms of consumption at the price of zero and 1 cent using
356 coordination games, as introduced by Krupka & Weber (2013). In September 2021, we built
357 the coordination game into an online survey (see the instructions in Appendix A) and recruited
358 subjects all over China using the panel service provided by wjx.cn[4] to include people from all
359 demographics. After giving informed consent, subjects first read through the instructions and
360 completed the practice rating exercise used in Krupka & Weber (2013), to ensure that they fully
361 understood the rules before moving on to the main task.

[3] Since our experiments were conducted during the Covid-19 pandemic in 2021 and 2022 in China, most people are likely to have considered the medical masks as socially-beneficial. Note that the value of the products in the benchmark and socially-beneficial contexts is controlled, as the per unit price of the medical masks is almost the same as of the low-value chocolate.
[4] wjx.cn is a leading survey company in China, with a strong reputation among universities and research institutes. The company provides a panel pool consisting of 48% females and 52% males; 70.63% are aged between 21 and 40; subjects are from all over China. See more details at https://www.wjx.cn/sample/service.aspx.

Table 1. Experimental design

Treatment	Situation	Condition
1	*Benchmark: Abundant low-value chocolates*	zero price
2		1-cent
3	*High-value context: Abundant Godiva chocolates*	zero price
4		1-cent
5	*Scarce context: 10 available units of low-value*	zero price
6	*chocolates*	1-cent
7	*Socially-beneficial context: Abundant masks*	zero price
8		1-cent

Each subject was told that there was the chance to win a bonus if their own response in the main task matched the responses of others. In the task, subjects were presented with a vignette describing a situation in which a person in a public setting is offered items of a good and has to choose a consumption amount. The version of the vignette each subject read depended on which of the eight treatments listed in Table 1 they were randomly assigned to. To ensure that we were measuring the social appropriateness of behavior in the contexts relevant to our study, the scenarios described were the same as those we would actually implement in the natural field experiment. For example, we described the zero-priced, abundant, low-value chocolates scenario as following:

"*Mr. A is at a coffee shop near Ningbo Library. While there, Mr. A notices that there is a big sign saying 'Chocolates for free'. When approaching, Mr. A finds that it's a marketing campaign for a university and there are abundant chocolates on the table. The chocolates are of low value.*"

The task was to rate the social appropriateness of each of 11 possible actions that Mr. A could take in this situation – that is, taking nothing or any positive integer between 1 and 10 units. We set the highest consumption level for evaluation at 10 units to reduce respondent

tiredness and boredom, and to match the available choices in the natural field experiment, in which any consumer who attempted to take more than 10 units would be told 10 was the limit. Responses were made by selecting one option on a 4-point Likert Scale (very socially inappropriate, somewhat socially inappropriate, somewhat socially appropriate, very socially appropriate).

After finishing data collection, we randomly selected 1/3 of the subjects as eligible to receive bonus payment. For every eligible subject, we selected one of the possible actions and compared his/her answer to others subjects' in the same treatment. If this answer was chosen by more subjects than any other for the selected action, he/she received an additional 50 RMB (7.8 USD) a few days after the experiment. [5]

3.2. Results: the effect on social appropriateness

The sample includes 577 subjects (see Table B-1 in Appendix B for a descriptive summary of subject characteristics). To quantitatively measure the norms, the standard approach in the literature following Krupka & Weber (2013) is to transform the responses into numerical values. The values -1, -1/3, 1/3 and 1 correspond to "very socially inappropriate", "somewhat socially inappropriate", "somewhat socially appropriate" and "very socially appropriate" respectively.

[5] The Krupka-Weber method has received criticism because the coordination game has multiple equilibria and subjects may in principle follow alternative coordination strategies besides those based on truthfully reporting perceived social appropriateness. Another criticism is that, while norms conceptually represent second-order beliefs (i.e, about what most others personally think is appropriate), this method could potentially instead measure higher-order beliefs. However, there is a growing body of evidence that suggests the method's potential weaknesses have little adverse impact in its actual application (e.g. Fallucchi & Nosenzo, 2022; Lane et al., 2023). See Görges & Nosenzo (2020) for a further discussion of methodological issues regarding the Krupka-Weber method.

In all conditions, the mean appropriateness N initially increases in consumption and reaches its peak at one or two units, after which it declines (Figure 1).[6] Taking one unit is significantly more socially appropriate than taking nothing in all treatments, as shown by two-tailedpaired t-tests (p-values < 0.01 in all treatments). Our finding that, within Chinese society, it is more appropriate to take one unit instead of zero is consistent with the conclusions of AGH from their experiment run on a group of colleagues in the United States.

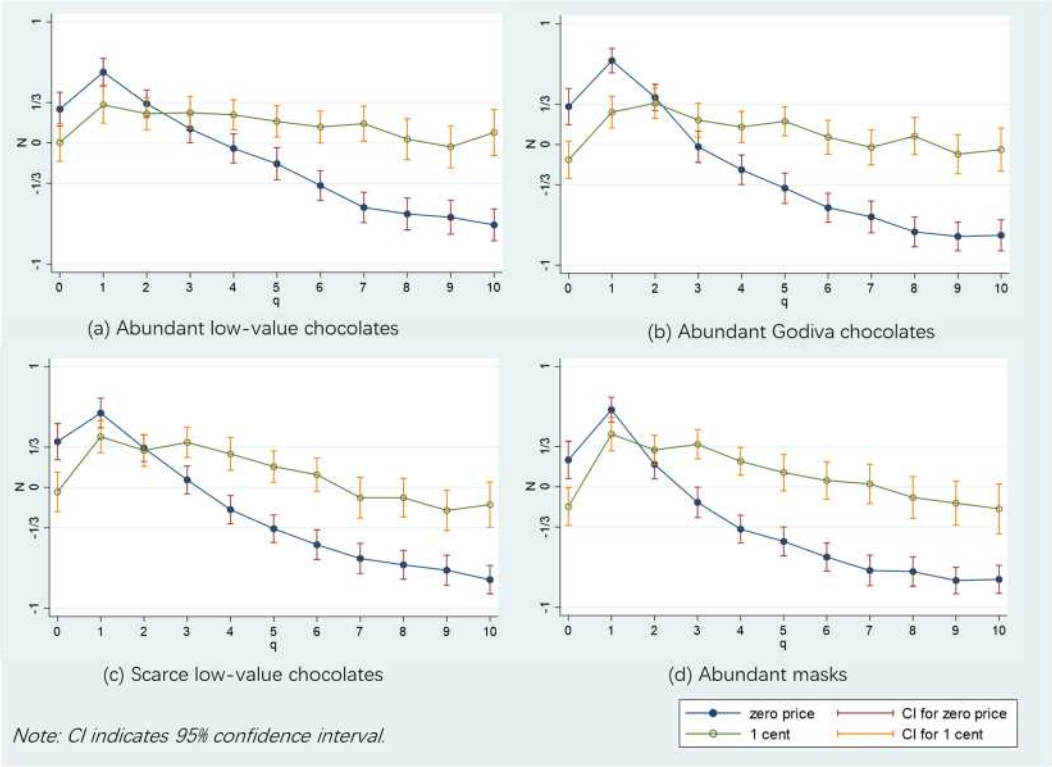


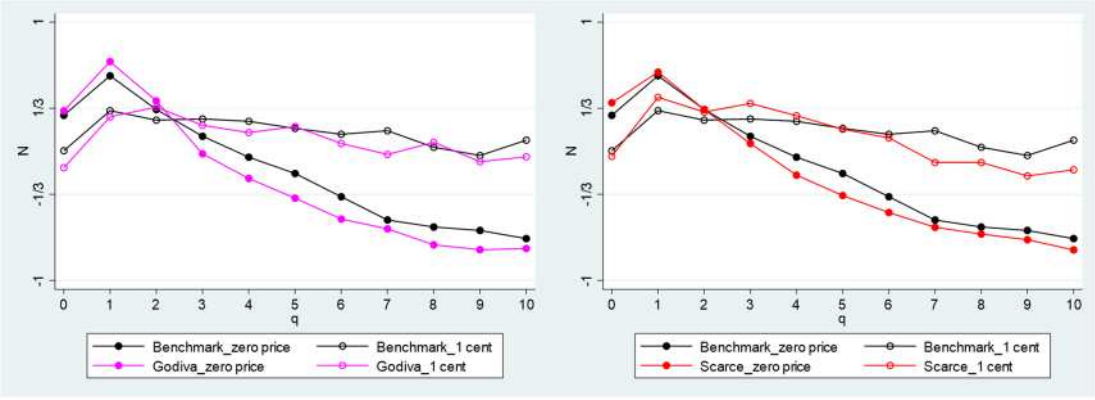
Figure 1. Mean of elicited social appropriateness for each consumption level

The most socially appropriate response towards free offerings is to take one unit. The mean N drops sooner under the *zero price* than under the *1-cent* condition. The appropriateness rating under the *1-cent* condition is not always significantly greater than the rating under the *zero price* condition, given the same consumption level. But it is the case for $q \geq 4$ in the benchmark

[6] In Table B-2 of Appendix B, we present the full distributions of responses in each treatment, highlighting the modal response for each consumption level.

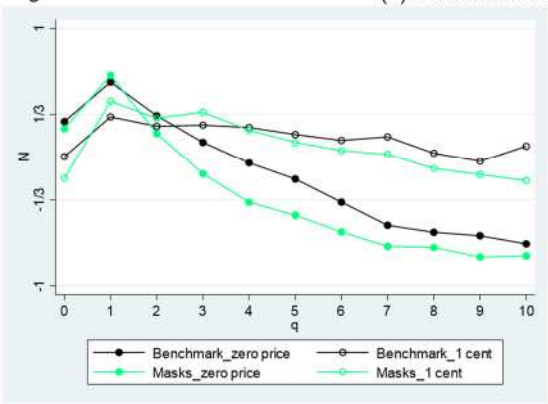
context and $q \geq 3$ in other contexts (see two-tailed t-test results in Table B-3, Appendix B). This generally supports **H1** by providing evidence for the detrimental effect of zero pricing on the social appropriateness of consumption at high levels. Graphically, the *1-cent* curve lies above the zero-priced curve after they intersect, in all four contexts.

Next, we consider differences across product contexts (Figure 2). In the *zero price* treatments, the social appropriateness of low consumption, at levels below three units, does not significantly differ from the benchmark in the other three contexts (see two-tailed t-test results in Table B-4, Appendix B). Taking nothing when offered socially-beneficial medical masks for free is slightly but insignificantly less appropriate than the same action in the non-socially-beneficial context. Being a maximal taker, who consumes the upper limit of 10 units for free, is also equally inappropriate in all context comparisons. However, moderately high consumption of zero-priced goods, i.e., $q \in (3,7)$, is significantly more socially appropriate in the benchmark context than the socially-beneficial context. This is illustrated by the *zero price* norm curve in the socially-beneficial context lying well below the corresponding curve in the benchmark one for consumption levels in this range. A similar comparison can be drawn between the benchmark and high-value contexts, with free consumption in the range of 4 to 6 units significantly more appropriate in the benchmark.



(a) Benchmark vs. high value

(b) Benchmark vs. scarce



(c) Benchmark vs. masks

Figure 2. Comparisons of mean *N* across different contexts

In the *1-cent* condition, there appears a very slight tendency for high levels of consumption to be more appropriate under the benchmark than other contexts. However, these differences are of very weak significance. Only 4 out of 30 test results yield p-values below 0.1, which is similar to what would be expected by chance when running this number of tests.

Taken together, these patterns entail that the magnitude of zero price effect on social appropriateness varies somewhat across different item contexts. Table B-5 in Appendix B calculates these differences, for each context comparison, at every level of consumption. In particular, within the consumption range 2 to 6, the three other contexts (high-value, scarce, socially-beneficial) all witness a more negative zero price effect on social appropriateness than the benchmark. We examine whether these differences are significant by running ordered logit

models with N as the dependent variable, pooling data from the benchmark and comparison context and estimating the interaction between the context dummy and the zero-price dummy, at each consumption level (see Table B-6 in Appendix B). The only two significant results are for the quantity levels $q = 3$ and $q = 4$, when comparing the socially-beneficial context versus the benchmark. In terms of directionality, these cross-context comparisons of the zero price effect tend to produce the same signs as hypothesized in **H1a** and **H1b** - but never significant – and the opposite signs to those hypothesized in **H1c –** but with only occasional significance. Overall, we do not find strong evidence for such cross-context differences.

4. Study 2: Natural field experiment

4.1. Design and procedure

Study 2 implemented in reality the vignettes from Study 1. The low-value chocolates we used in this natural field experiment were from Le conté, a local brand in China. The retail price per piece was 0.7 RMB (0.14 USD), while the Godiva chocolate used in the high-value treatments retails at 12.81 RMB per piece, with the same flavor (milk) and roughly the same weight in each case (Le conté is 5g per piece and Godiva 4.7g per piece). The socially-beneficial product we used was an individually packed mask[7], whose per unit price was very similar to the Le conté chocolates'.

[7] The individual packages reduce the risk of contamination that may deter people from accepting the masks.

Figure 4. Chocolates and masks used in the experiment

Left: Milk chocolates in Godiva (upper) and Le conté (bottom); *Right:* Individually packed masks

An important challenge facing an attempt to measure zero price effects in the natural setting of our study is that it is impossible to hold constant absolutely everything beside the product's price between the two price conditions. This is due to the fact that selling a product for 1 cent imposes a transaction cost on consumers, requiring them to either reach into their pocket to hand over cash or (commonly in China) transfer the money using a mobile payment method, while giving away a product for free does not require such efforts. Potentially, this transaction cost could influence both the percentage of takers and the average quantity consumed by takers. Though existing literature suggests the zero price effect of on n is unrelated to transaction cost (Mazar et al., 2017); the absence of transaction costs seems likely to attract more consumers because there is nothing easier than grabbing things without having to do anything else. Meanwhile, the transaction cost under positive pricing might drive away marginal consumers who would otherwise only consume a small number of units, so the takers who remain might tend to be the more enthusiastic consumers who purchase a large quantity.

As such, we can see that our hypothesized zero price effects on consumption (more takers but lower average amount consumed by those who take), which we propose to be driven by social norms, might in principle instead just be due to the absence of transaction costs under free pricing.

Therefore, our natural field experiment introduces two versions of the zero price condition, both of which we will analyze in comparison to the *1-cent* condition. We create one version which does build a transaction cost, comparable to that in the *1-cent* condition, into paying zero for the products: this pay & refund (hereafter, *p & r*) condition requires takers to first pay 1 cent for the items and then receive the money back immediately. The other version, named the *pure free* condition, does not impose a transaction cost, as takers are simply allowed to take the products without any other action required. We regard the two versions of the zero price condition as facilitating the measurement of upper and lower bounds for zero price effects on demand. The *1-cent* vs *pure free* difference provides an upper bound, which may be an overestimation, inflated by the presence of transaction costs only in the *1-cent* condition. Meanwhile, the difference between the *1-cent* and *p & r* conditions indicates a lower bound, because the *p & r* treatment, while controlling for the transaction cost, could possibly also induce consumer suspicion in response to the seemingly unnecessary step of payment and refund, thus deterring takers in this treatment and underestimating zero price effects on demand.

Our natural field experiment was implemented in two waves, first in a café at the entrance of the City Library in Ningbo, Zhejiang Province, China, from September 22nd to November 20th, 2021, and second in the foyer of a shopping mall on 5th and 6th February, 2022. According

to the café owner, only 10% of customers approximately repeatedly visited the café[8]. Because many of the customers stayed in the café for quite a while, we only conducted one treatment on a given day. All 12 treatments (the zero price treatments in Table 1 are doubled because we have two versions for each) were repeated four times in the same café, three times on weekdays in the afternoon and once on Saturday in the afternoon. Each session lasted for 4 hours. In the second wave, we ran each treatment once for one hour, with all sessions between 10 AM and 6 PM on a weekend, and a 10-minute break between sessions.

During the experiment, the experimenters were seated at a table with a tray, ready to provide items (chocolates or masks) to passers-by. A large sign was placed in front of the table. It was alternated between "Chocolates (Masks) for free" in the *pure free* or *p & r* condition and "Chocolates (Masks) for 1 cent each" in the *1-cent* condition (Figure 5). In the abundant treatments, every subject was faced with 100 pieces of the good, while only 10 units were on display in the scarce treatments. The chocolates (masks) were replenished after each time any were taken, to keep the units on display constant throughout each session.

[8] Repeated participation is inevitable, either in the café or in the foyer of the shopping mall. Some were staff who were working in the venue. We allowed re-entering our experiment in different sessions. if someone showed up at our table and interacted with us more than once within a session, we noted down the total number of pieces they took.

Figure 5. Signs for different treatments

The experimenters passively waited for subjects rather than actively approaching them. When someone approached, the experimenters invited them to take as much as they wanted from the tray and secretly noted down the quantity taken. In the abundant treatments, only when anyone wanted to take more than 10 units, the experimenters explained that we had a quantity limit of 10. Subjects did not know that they were participating in an experiment. The experimenters explained that the giveaway was “a marketing campaign for our university”. All sessions were recorded by a hidden camera so that we could rely on the video to double-check the data (Figures 6 & 7).

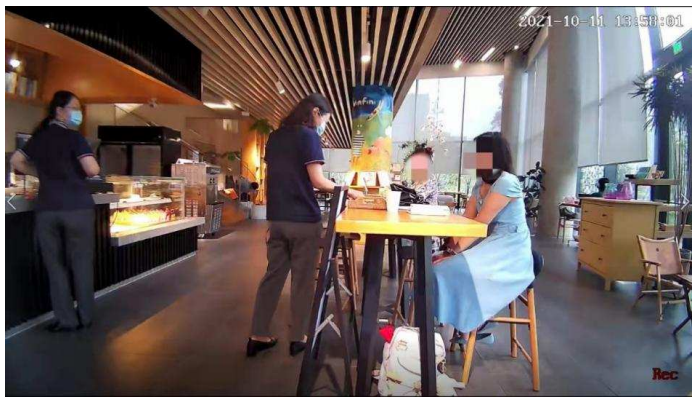


Figure 6. A screen shot of the video recorded during the first wave

Figure 7. A screen shot of the video recorded during the second wave

At the same time, we measured the pedestrian traffic by counting people who appeared in the café or the foyer. In the first wave, Saturdays were busier, but we balanced treatments across weekdays and Saturdays. In the second wave, there was no obvious peak or trough in busyness. Consistently in both waves, we counted our sample as only including those who stopped in front of our table to read the sign or asked questions, and who passed by but obviously noticed the sign. In other words, people who clearly made a deliberate decision not to take were marked as consuming zero units. It made sense to exclude others – for example, in wave 1, there was no chance for people who faced at the cashier all the time or who took the way behind us to notice our sign (Figure 6).

Subjects were asked to scan the pay code (either with Wechat Pay or Alipay[9]) provided by the café (first wave) or a student club of our university (second wave) to pay the price in the *1-cent* condition (Figure 8).

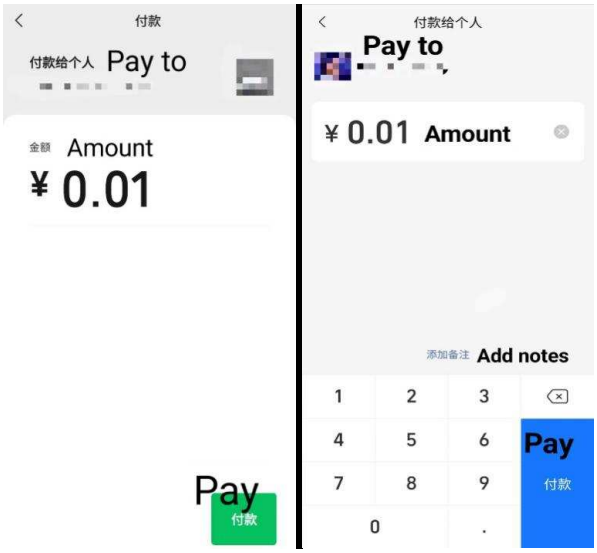


Figure 8. Paying 1 cent via Wechat (left) or Alipay (right)[10]

As explained above, we introduced the *p & r* condition to observe behavior when subjects needed to exert the same effort as in the *1-cent* condition to get the zero-priced items. Under this condition, subjects paid 1 cent for each item they took and got the money back immediately. This can be conveniently done in a city in China where the majority of payments are made through mobile payment platforms such as Wechat Pay and Alipay. Thus, they exerted identical effort (scanned the pay code, typed in the amount, and clicked the "pay" button to confirm) as

[9] Mobile payment platforms like Wechat Pay and Alipay generate two-dimensional pay codes. By scanning the pay codes offered by merchants or other individuals, one can transfer any amount equal to or greater than 0.01 RMB to their accounts. In urban China, almost everyone has an account for either platform or both. These are the normal ways of making payments in urban China and people seldom use cash. During the experiment, very few people had trouble making the mobile payment.

[10] The English is added for translation purposes and was not actually on the original interfaces of the apps.

in the *1-cent* condition, but nothing in monetary terms. The effort required to make the transaction was constant across all positive quantities of consumption. We guaranteed the subjects that scanning the code was not done to collect their personal information; the purpose was purely for keeping a record of the giveaway.

4.2. Results: the effect on n

Table 2 displays the behavioral patterns of responses to free or almost-free giveaways, combining all data from all treatments, consisting of 600 observations in wave 1 and 793 in wave 2.

Table 2: Summary of percentage of takers (n) and average amount taken by takers ($\bar{q}|q>0$)

Treatment	**Obs**	$\boldsymbol{n}$	$\boldsymbol{\bar{q}|q>0}$	$\boldsymbol{\bar{q}=n\times(\bar{q}|q>0)}$
abundant low-value chocolates				
pure free	117	42.74	1.98	0.85
p & r	106	40.57	7.44	3.02
1-cent	121	20.66	6.72	1.39
abundant Godiva chocolates				
pure free	115	53.04	2.07	1.10
p & r	99	28.28	5.57	1.58
1-cent	111	44.14	9.12	4.03
scarce low-value chocolates				
pure free	113	31.86	1.64	0.52
p & r	135	13.33	4.00	0.53
1-cent	90	15.56	6.00	0.93
abundant masks				
pure free	128	35.16	2.89	1.02
p & r	109	13.76	6.47	0.89
1-cent	149	17.45	8.54	1.49

Comparing the *1-cent* and *pure free* conditions, the zero price effect on the percentage of takers, n, is positive. In all four contexts, a higher percentage of subjects took chocolates or masks in the *pure free* condition than in the *1-cent* condition. For example, in the benchmark context, 42.74% of subjects took zero-priced low-value chocolates from the abundant pile, while the percentage was 20.66% in the *1-cent* condition. Chi-squared tests show that there are

553 significantly more takers in the *pure free* condition than in the *1-cent* condition in all except for
554 the high-value context (p-values equal 0.00, 0.18, 0.01 and 0.00 in the benchmark, high-value,
555 scarce and socially-beneficial contexts, respectively).

556 However, comparing the *1-cent* condition to the other zero price treatment, the *p & r*
557 condition, finds a milder positive effect of zero pricing on n in the benchmark context and even
558 an adverse one in the other contexts. In the benchmark context, the increase in n when moving
559 from *1-cent* to *p & r* (40.57%-20.66%=19.91%), is less than that when moving from *1-cent* to
560 *pure free* (42.74%-20.66%=22.08%). In the high-value, the scarce and the socially-beneficial
561 contexts, the changes in n in *p & r* relative to *1-cent* are -15.86%, -2.23% and -3.69%,
562 respectively. These changes are found to be significant by the Chi-squared statistic in the
563 benchmark and the high-value contexts (p-values equal 0.00, 0.02, 0.64 and 0.42, in the
564 benchmark, high-value, scarce and socially-beneficial contexts, respectively). Overall, then, we
565 have mixed support for **H2 –** it is consistently supported based upon the evidence of the *pure*
566 *free* treatment, but not the *p & r* treatment.

567 Regarding the effects of different products, we find Godiva chocolates are more attractive
568 than the low-value chocolates in the *1-cent* and *pure free* treatments, but not in the *p & r*
569 treatment; therefore, **H2a** is not fully supported. Meanwhile, low-value chocolates are taken
570 less when they are scarce than when they are abundant in all price conditions. Many people
571 chose to take nothing in the scarce context, perhaps so they could allow the items to go to those
572 who would like them more. The percentage of takers is also lower in the socially-beneficial
573 context than in the benchmark context under all conditions.

For the case where the transaction cost is not controlled, the zero price effect on n becomes less positive when the products are of higher value. The change in n from the *1-cent* to the *pure free* condition for abundant low-value chocolates (22.08%) is greater than for abundant Godiva chocolates (53.04%-44.14%=8.90%). For the comparison which does control the transaction cost, the contrast is even stronger; the change in n from the *1-cent* to the *p & r* condition in the high-value context is negative (28.28%-44.14%=-15.86%) while it is positive in the low-value context (19.91%). Difference-in-differences (DID) tests using binary logit models produce negative and significant interaction coefficients for both comparisons (model using *pure free* and *1-cent*: coef.=-0.70, p-value=0.08; model using *p & r* and *1-cent*: coef.=-1.66, p-value=0.00), meaning that the difference in zero price effect on n between lower value and higher value products is significant (Table C-1 and Table C-2 in Appendix C).

When not controlling the transaction cost, the zero price effect on n becomes less positive when the available units decrease from an abundant level to a scarce level: the increase from *1-cent* to *pure free* in percentage of takers is less in the scarce context (31.86%-15.56%=16.30%) than in the abundant context (22.08%). When controlling the transaction cost, the zero price effect on n becomes negative in the scarce context (13.33%-15.56%=-2.23%), in contrast to the positive effect in the abundant context (19.91%). DID tests show that the zero price effect on n is significantly different between abundant and scarce contexts only when comparisons are made using the *p & r* and *1-cent* conditions (model using *pure free* and *1-cent*: coef.=-0.12, p-value=0.79; model using *p & r* and *1-cent*: coef.=-1.14, p-value=0.02. See Table C-1 and Table C-2 in Appendix C).

595 If the products are socially-beneficial, there is a smaller increase in n from *1-cent* to *pure*
596 *free* (35.16%-17.45%=17.71%) compared with that in the benchmark context, and a decrease
597 in n from *1-cent* to *p & r* (13.76%-17.45%=-3.69%) in contrast to the positive change (19.91%)
598 observed for this comparison in the benchmark context. Again, the DID test fails to provide
599 consistent evidence for the zero price effect significantly differing between socially-beneficial
600 and non-socially-beneficial contexts (model using *pure free* and *1-cent*: coef.=-0.11, p-
601 value=0.79; model using *p & r* and *1-cent*: coef.=-1.24, p-value=0.01. See Table C-1 and Table
602 C-2 in Appendix C). However, based on either zero price treatment, the effects observed are
603 directionally opposite to those hypothesized in **H2c**, which proposed socially-beneficial context
604 would result in a more positive zero price effect on n.

605 4.3. Results: The effect on $q|q > 0$

606 The distribution of demand at the individual level in each context demonstrates a roughly
607 bimodal pattern. There are two spikes at the extremes of the distribution: taking 0-1 units, and
608 taking the greatest amount allowed. Those who fall between the two extremes are quite few.
609 Taking 0 is the modal decision in all treatments. Among those who do take something, a higher
610 proportion are maximal takers (taking 10 units) in the *1-cent* condition than either zero price
611 condition in all contexts except for the benchmark, where the proportion of maximal takers is
612 higher in the *p & r* condition.

613 If we exclude the non-takers (Figure 9), it is clear that, when the items are offered free
614 without any transaction cost (blue bar), taking one unit is the modal choice in all four item
615 contexts. Those who took one or two units accounted for more than 75% of the takers within

each *pure free* treatment. However, when the transaction cost was added to the zero-priced goods (green bar), $q = 10$ accounted for the highest proportion of takers, except for in the scarce context. When the per unit price was 1 cent (red bar), except for in the benchmark context, the most frequent positive amount taken was 10 units, especially so in the high-value context. Even in the scarce context, 6 out of 14 takers bought all the chocolates they saw under the *1-cent* condition.

Figure 9. Percentage of takers at each amount level – excluding non-takers

We hypothesized (**H3**) that the overall effect of zero pricing on demand would be negatively influenced by an adverse effect on $q|q > 0$. Indeed, as shown in Table 2, $\bar{q}|q > 0$ decreases in the *pure free* relative to the *1-cent* condition. This holds true and is found by two-tailed t-tests to be significant at the 1% level in all contexts (see Table C-3 in Appendix C),

628 which supports **H3**. People seem willing to take more when they have paid something, even
629 though the payment is trivial.

630 When instead comparing the *p & r* against the *1-cent* condition, our two-tailed t-tests
631 (Table C-3) still find the zero price effect on $q|q > 0$ is significantly negative in the high-value
632 and socially-beneficial contexts (p-values=0.00 and 0.08 respectively), but also that it is
633 insignificant in the other two contexts. The difference in $\bar{q}|q > 0$ between the *p & r* and *1-cent*
634 conditions is smaller than that between the *pure free* and *1-cent* conditions, consistent with our
635 expectation that the p & r treatment would give us the lower bound of the zero price effect.
636 Nevertheless, our results broadly support **H3**.

637 The zero price effect on $q|q > 0$ becomes more negative when the products provided are
638 of higher value, as we hypothesize in **H3a**, although the significance of this effect is mixed.
639 The average amount taken by takers decreases further as a result of zero pricing in the Godiva
640 chocolates context (*pure free* vs. *1-cent*: 2.07-9.12=-7.05; *p & r* vs. *1-cent*: 5.57-9.12=-3.55)
641 than in the benchmark (*pure free* vs. *1-cent*: -4.74; *p & r* vs. *1-cent*: 0.72), as shown in Table 2.
642 A DID test using a count model with Poisson distribution (Table C-4 in Appendix C) shows
643 that the zero price effect on $q|q > 0$ in the high-value context was stronger, and nearly
644 significantly so, than in the low-value context (coef.=-0.26, p-value=0.10), when using data
645 from the *pure free* treatment. As shown in Table C-5, the difference is significant if we use data
646 from the *p & r* treatment instead (coef.=-0.60, p-value=0.00).

647 We hypothesized that, when the products become scarce, zero price effect on $q|q > 0$
648 becomes more negative (**H3b**). Some evidence is found for this. The DID test produces a

649 significantly negative coefficient on the interaction term between the zero price condition
650 dummy and the scarce condition dummy, when using data only from the *p & r* version of the
651 zero price condition (coef.=-0.51, p-value=0.01. See Table C-5). However, the equivalent
652 coefficient is not significant in the model taking data instead from the *pure free* treatment
653 (coef.=-0.08, p-value=0.72, see Table C-4).

654 The zero price effect on $q|q > 0$ becomes more negative when the products provided are
655 socially-beneficial masks (*pure free* vs. *1-cent*: 2.89-8.54=-5.65; *p & r* vs. *1-cent*: 6.47-8.54=-
656 2.07) rather than non-socially-beneficial baseline chocolates (*pure free* vs. *1-cent*: -4.74; *p & r*
657 vs. *1-cent*: 0.72). This rejects **H3c**, which hypothesized the effect would instead become less
658 negative. The DID test finds the interaction between zero pricing and the socially-beneficial
659 context to be significant when using data from the *p & r* treatment (coef.=-0.38, p-value=0.01;
660 see Table C-5), but insignificant when instead using data from the *pure free* treatment
661 (coef.=0.14, p-value=0.41; see Table C-4). Therefore, once again, we fail to identify consistent
662 evidence of the zero price effect on $q|q > 0$ differing across product contexts.

663 4.4. Results: The overall effect

664 Generally speaking, switching from the *1-cent* condition to either the *pure free* or the *p &*
665 *r* condition is associated with a decrease in the overall level of demand (see the final column in
666 Table 2). This outcome is in line with what the AGH experiment reports. The mostly negative
667 zero price effect on $q|q > 0$ tend to outweigh the often positive effect on n, resulting in a
668 decline in average demand. Such a decline is most obvious and greatest when high-value
669 products are involved. The only exception is found in the benchmark situation when the *p & r*

condition is implemented instead of *pure free*. Here, the with-transaction-cost version of zero price encourages takers to take slightly more pieces than the *1-cent* condition; as a result, the overall effect of zero pricing is positive.

We rely on two-tailed *t*-tests (reported in Table C-6, Appendix C) to analyze the significance of the effect of zero pricing on total demand. In each context, the average amount taken by all subjects is less in the *pure free* than in the *1-cent* condition (benchmark: 0.85-1.39=-0.54; high-value: 1.10-4.03=-2.93; scarce: 0.52-0.93=-0.41; socially-beneficial: 1.02-1.49=-0.47). This difference is strongly significant in the high-value context, of borderline significance in the benchmark context, and insignificant in the other contexts (benchmark: p-value=0.10; high-value: p-value=0.00; scarce: p-value=0.14; socially-beneficial: p-value=0.20).

Focusing instead on the *p & r* condition, overall demand under this condition is less than that in the *1-cent* condition in all contexts but the benchmark (benchmark: 3.02-1.39=1.63; high-value: 1.58-4.03=-2.45; scarce: 0.53-0.93=-0.40; socially-beneficial: 0.89-1.49=-0.60). Again, the *t*-test results find these differences are only significant in the benchmark and high-value contexts (benchmark: p-value=0.00; high-value: p-value=0.00; scarce: p-value=0.20; socially-beneficial: p-value=0.14). The results suggest that requiring payment of a transactional effort-based but nonmonetary cost may be the best way to arouse consumption of a hedonic and low-value product (benchmark). Meanwhile, for other product contexts, in order to promote total consumption, a trivial monetary cost is preferable to either making the product completely free or requiring payment of a non-monetary transaction cost. This is significantly the case for high-value products.

691 The effect of the *pure free* condition on overall demand is significantly more negative in
692 the high-value than in the low-value context at 1% level, according to DID tests using Poisson
693 regression reported in Table C-7 (coef. =-0.81, p-value=0.00). Similar tests show no differences
694 in the overall effects of *pure free* between benchmark and scarce (coef.=-0.09, p-value=0.69),
695 or between benchmark and socially-beneficial contexts (coef.=0.11, p-value=0.67). Meanwhile,
696 if we instead compare the *p & r* condition against the *1-cent* condition, equivalent DID tests,
697 reported in Table C-8, show the overall zero price effect becomes significantly more negative
698 in all contexts relative to the baseline (high-value vs. low-value: coef.=-1.72, p-value=0.00;
699 scarce vs. abundant: coef.=-1.34, p-value=0.00; socially-beneficial vs. non-socially-beneficial:
700 coef.=-1.29, p-value=0.00). We therefore do find some consistent evidence that the overall
701 effect on consumption is affected by product context – namely, that higher-value products
702 trigger a more negative effect.

703 5. The influence of social norms on actual behavior

704 Based on a casual inspection of the results from the two studies, it appears that
705 consumption behavior is often closely related to social appropriateness. People often take the
706 most socially appropriate action. Figure 9 shows that, in all four contexts, the consumption level
707 of takers under the *pure free* condition peaks at one unit, which was shown in Figure 1 to be the
708 most socially appropriate level under zero pricing. In the *1-cent* condition the percentage of
709 maximal takers is higher, reflecting that the social appropriateness of taking 10 units at this
710 price is much higher than at the price of zero. The norm curves for the *1-cent* treatments in
711 Figure 1 are relatively flat, indicating that all actions are roughly equally appropriate. Therefore,

people are free to maximize their utility by taking any amount of the items. On the other hand, evidence from the *p & r* condition is less clear-cut. This condition has a consumption pattern similar to *pure free* in the scarce context but similar to the *1-cent* condition in other contexts – it peaks at 1 unit in the scarce context and peaks at 10 units in other contexts.

More generally, zero price effects on social appropriateness and $q|q > 0$ are directionally consistent. Our natural field experiment observes this effect on $q|q > 0$ to be negative in nearly all cases, no matter which version of the zero price condition is implemented. Consistently, taking a given number of items is significantly less appropriate under the *zero price* than the *1-cent* condition for $q \geq 4$ in the benchmark context and $q \geq 3$ in the other contexts (Table B-3).

We further probe how material incentives and social appropriateness influence people's taking behavior by estimating conditional logit regressions, reported in Table 3. These estimate how the likelihood of a given consumption level, by a subject in the natural field experiment, is affected by this consumption level's material payoff, deriving the parameter β, and by its social appropriateness, yielding the parameter γ. In using conditional logit models to estimate how choices relate to social appropriateness, we are following a common approach in the literature initiated by Krupka and Weber (2013).

Our regressions only analyze the consumption range 1-10, excluding non-takers. The reason is because taking any positive amount entails an effort cost while taking nothing does not in any of the treatments, which may be what makes it the preferred choice for many subjects. We lack a reliable estimate of the perceived cost of effort, but can assume it to be constant for all positive consumption levels. Therefore, we can safely exclude this effort cost from our

733 model when only considering the range 1-10, while if we had also included the consumption
734 level zero, without controlling for this cost, its effects might be spuriously attributed by the
735 model to other factors.

736 We define material benefit as the product of quantity and the estimated per unit returns,
737 which are calculated as the difference between the product's retail price and the price subjects
738 actually pay for it. As mentioned before, the per unit retail prices for low-value chocolates,
739 Godiva chocolates and masks are 0.70, 12.81 and 0.70 RMB, respectively. The price subjects
740 actually pay for each piece is either 1 cent (under the *1-cent* condition) or zero (under the other
741 two conditions). *N* is the average response to the norm-elicitation question for the relevant
742 action in the relevant treatment in Study 1. *N* under the *p & r* condition takes the same value as
743 under the *pure free* condition.

744 Table 3. Estimation results from conditional logit regressions

Dependent Variable: Action Chosen				
	(1) Pure free	(2) 1-cent	(3) P & r	(4) Pooled
Material benefit	0.008	0.061***	0.007	0.023***
	(0.007)	(0.010)	(0.006)	(0.003)
N	3.234***	-0.836	0.369	2.363***
	(0.253)	(0.744)	(0.266)	(0.151)
Subjects	192	114	104	410
Pseudo R^2	0.413	0.207	0.004	0.145
Log likelihood	-259.655	-208.093	-238.458	-806.835
AIC	523.309	420.186	480.916	1617.670
BIC	534.430	430.263	490.810	1630.307

The dependent variable represents whether a given action (i.e. consumption level) is chosen or not. Standard errors are in parentheses. *** p<0.01, ** p<0.05, * p<0.1

745 We display separate estimation results based on data from the *pure free* condition (model

1), the *1-cent* condition (model 2), the *p & r* condition (model 3), and the pooled data from all three price conditions (model 4). Overall, the evidence suggests that actions are indeed influenced by norms. As expected, coefficients estimated for both material benefit and social appropriateness are positive and significant in the pooled model. This indicates that people are more likely to choose amounts which, ceteris paribus, offer a greater material benefit and are more socially appropriate. In the first three models, the effect of material benefit is significant only in the *1-cent* condition while the effect of social appropriateness is significant only in the *pure free* condition. The findings demonstrate that when there is a positive price, the consumption choice largely depends on material benefit, whereas when there is no monetary cost and also no transaction cost, social norms come into play, as the norm compliance parameter γ is strengthened (and, as shown earlier, the actual content of the norms much more sharply differentiate the appropriateness of different actions). Interestingly, however, social norms do not play such a clear role in the *p & r* treatment, in which we find neither γ nor β to be significant.

6. Conclusion

This study has examined social appropriateness as a possible channel for zero price effects on consumption choices, in terms of both whether and how much to consume. We tested this empirically in three steps. First, we quantitatively measured the social appropriateness of taking 0-10 units of goods under the *1-cent* and the *zero price* conditions in different contexts, testing for a zero price effect on norms of consumption. Second, we recorded behavior when items were actually offered, in the corresponding contexts, at these prices. To address the

767 measurement challenge posed by disparities in transaction costs between free giveaways and
768 low-cost sales, both a without-transaction-cost version of zero price – the *pure free* condition
769 – and a with-transaction-cost version – the *p & r* condition – were introduced into the natural
770 field experiment, and we used both to measure the zero price effects on consumption behavior.
771 Finally, we studied the relationship between the measured social norms and consumption
772 choices.

773 We have found that zero pricing has a clear and significantly negative effect on the social
774 appropriateness of high levels of consumption. Regarding actual behavior, the estimates
775 produced by our two zero price conditions differ markedly. However, we find that, as the price
776 changes from 1 cent to zero, it is often the case that more people demand the product, and
777 almost always the case that the quantity demanded per taker reduces, both of which are
778 consistent with our hypotheses. The zero price effect on total consumption is generally negative.
779 Overall, the patterns we identify are consistent with the arguments introduced by AGH that zero
780 pricing changes social norms, which act as a constraint on the excessive consumption of free
781 goods. This is further supported by our conditional logit regressions, which determine that more
782 socially appropriate consumption choices are more likely to be chosen. These models also
783 suggest that there is a stronger tendency for norm-compliance under zero pricing, while under
784 positive pricing decisions are more strongly influenced by material gains. In contrast to our
785 hypotheses, however, we do not find a lot of evidence that the effects we study differ according
786 to the value, scarcity or social-beneficialness of products.

787 One major contribution of this paper comes from the quantitative measurement of social

norms. Through this step, the paper provides more evidence to support the key ideas in AGH. We find that, in all *zero price* treatments and in all but one *1-cent* treatments, the most socially appropriate consumption choice is to take one unit. However, as consumption levels increase, the social appropriateness drops more abruptly under zero pricing. This appears to limit overconsumption at the individual level. There are interesting applications of this result, as discussed in AGH. For instance, attempts to limit environmentally unfriendly consumption – such as wasteful use of energy-intensive amenities by hotel guests – might find they are *less* successful if they impose a small price on consumption rather than allowing it for free.

Another contribution is that we introduce a new method that takes into consideration transaction costs as a possible factor relating to the size of zero price effects. Our two zero price conditions provide upper and lower bounds on the effects of zero pricing on consumption behavior. The disparity between the two bounds raises the possibility that transaction costs play a large role in zero price effects. However, one should note that, besides the transaction cost it imposed, there are other possible reasons why the *p & r* condition deterred consumption. The unusual request for payment which would immediately be refunded might have made consumers hesitant. Even though the experimenters assured subjects that its purpose was not to obtain personal information and that the money would be refunded immediately, some still seemed to be suspicious.

It is likely that people feel more compelled to conform to norms when they are observed by an experimenter (Boshi et al., 2016). One advantage of our study is that the subjects whose behavior we observe did not know they were being experimented on. Nevertheless, their

809 decisions were made in a public setting, in which the effects of social pressure might be
810 relatively strong and the normative influence of social norms might be amplified as well
811 (Lapinski & Rimal, 2005). While such public settings are normal in consumption decisions,
812 they are not universal – for instance, consumption decisions may also be made in less
813 observable contexts, especially when conducted online. Whether norms as strongly constrain
814 the overconsumption of free goods when it is less observable would be an interesting question
815 for future research. How the effects we have studied relate to the personal attributes of
816 consumers, which we could not practically collect data on in our natural field experiment, is
817 another potential avenue for future research.

818

Appendix A. Instructions of Norm-eliciting task

尊敬的参与者:

谢谢您参与这次问卷调查。该研究主要探究人们对一些行为社会得当度的看法，即这些行为是否在社会上被认为是得当的。在接下来的问题中，我们将为您描述一个情景及一些假设性行为，请您评估每种行为的社会得当度。

所谓“在社会上被认为是得当的”，我们指的是大多数人认为是“正确”或“合乎道德”的行为。换言之，如果一个人选择了一个“不得当”的行为，那么其他人可能会因为 ta 的行为而生气。

具体地，需要您真实地评价您认为这些行为在他人眼里的得当程度。本问卷不记名，请放心作答。

我们会在所有参与者完成问卷后，随机抽取三分之一位参与者，并从中为每一位参与者随机抽取一题（每行是一题）。若其回答与众数一致，则获得额外的 **50** 充人氓布奖励。所有参与者均来源于问卷星样本库。(如获额外奖励，将由问卷星在 10 个工作日内发放)。如您的回答与大多数其他参与者的回答不一致，则没有奖励。

完成本问卷（包括读题和作答）总共将耽误您 5 分钟左右。

您是自愿参与此次问卷调查的。您可以在任何时候选择放弃这次的问卷调查，并要求您提供的信息不被使用在此次调查中。您提供的所有信息都是保密的。在使用您提供的信息时不会涉及您的身份以及个人信息。

宁波诺丁汉大学已根据研究道德检查程序对这项研究项目进行检查。这一程序是在学校关于研究行为和研究道德的行为标准的指导下进行的。如果您现在或将来有任何疑问，请联系本人或我的导师。如果您对我在问卷中的研究行为或研究道德有任何质疑，请联系我的导师或者宁波诺丁汉大学的道德委员会。

Participant Information Sheet

Dear Participant,

Thank you for agreeing to participate in this questionnaire survey. The project is a study about people's perceptions toward the social appropriateness of particular behaviours, i.e., to which extent a behaviour is perceived as morally right in the society. In the following task, we will describe a situation and a set of behaviours. You will be asked to evaluate the social appropriateness of each behaviour.

By socially appropriate, we mean behaviour that most people agree is the "correct" or "ethical" thing to do. Another way to think about what we mean is that **if the individual were to select a socially inappropriate choice, then someone else might be angry at this person for doing so.**

Specifically, we're asking you to honestly report what you think other people think about the correctness/ethicality of behaviour. Remember, there is NO names attached to responses, please feel free to answer.

After all participants finish the survey, we will first **randomly select one third of the participants** to be eligible for bonus; then randomly choose ONE question for each eligible participant. If the response matches the modal answer, the participant will receive **an additional bonus of 50 RMB**. All participants are recruited through the WJX panel service. Additional bonus will be given through WJX within 10 business days if you are eligible. If you fail to select the answer selected by the most other subjects, you get zero bonus payment.

Including the time for reading these instructions, the study will take about 5 minutes to complete.

Your participation in the survey is voluntary. You are able to withdraw from the survey at any time and to request that the information you have provided is not used in the project. Any information provided will be confidential. Your identity will not be disclosed in any use of the information you have supplied during the survey.

The research project has been reviewed according to the ethical review processes in place in the University of Nottingham, Ningbo. These processes are governed by the University's Code of Research Conduct and Research Ethics. Should you have any question now or in the

future, please contact me or my supervisor. Should you have concerns related to my conduct of the survey or research ethics, please contact my supervisor or the University's Ethics Committee.

• 本人已阅读声明，项目组织者已经向我解释了研究项目的性质和宗旨。本人理解并同意参与。
• 本人理解项目的目的和在项目中的参与作用。
• 本人明白可以在研究项目的任何阶段退出，不会因此影响现在以及将来的状况
• 本人明白研究过程中信息可能会被公开，但本人身份不会被确认，个人的调查结果始终是被保密。
• 本人了解数据会根据数据保护相关法律进行存储。
• 本人知道，如果需要进一步有关研究的信息可以联系研究者或者导师，如果需要对参与研究提出投诉则可以联系宁波诺丁汉大学科研伦理小组委员会。

• I have read the Participant Information Sheet and the nature and purpose of the research project has been explained to me. I understand and agree to take part.
• I understand the purpose of the research project and my involvement in it.
• I understand that I may withdraw from the research project at any stage and that this will not affect my status now or in the future.
• I understand that while information gained during the study may be published, I will not be identified and my personal results will remain confidential.
• I understand that data will be stored in accordance with data protection laws.
• I understand that I may contact the researcher or supervisor if I require more information about the research, and that I may contact the Research Ethics Sub-Committee of the University of Nottingham, Ningbo if I wish to make a complaint related to my involvement in the research.

我已阅读并同意以上条款
I have read and agree to the terms [单选题] *

○是，继续 Yes, continue

○否，退出 No, exit (请跳至第问卷末尾，提交答卷)

为了让您更好地了解这一部分题目如何进行，我们将提供一个例子。

To give you an idea of how this part will proceed, we will go through an example.

以下为例题:

小 A 正在宁波市图书馆附近的一家咖啡店里。他注意到有人把钱包落在了一张桌子上。小 A 当下有四种选择：占为己有、问问附近的人有没有落钱包、把钱包留在原处、把钱包交给店长。下表列出了小 A 的四种行为选择，请判断每一种行为是否在社会上被认为是得当的。

“在社会上被认为是得当的”行为，指大多数人认为是“正确”或“合乎道德”的行为。换言之，如果小 A 选择了一个“不得当”的行为，那么其他人可能会因为 ta 的行为而生气。

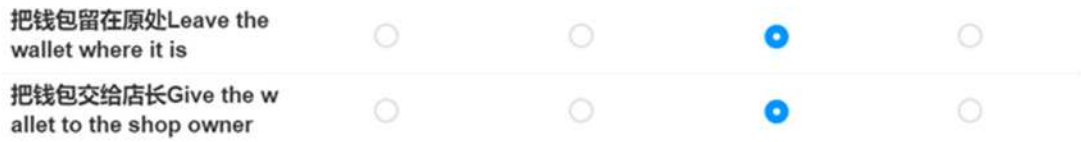
A possible scenario in this questionnaire could be as follows:

Imagine Mr. A is at a coffee shop near Library of Ningbo. While there, Mr. A notices that someone has left a wallet at one of the tables. Mr. A must decide what to do. Mr. A has four possible choices: take the wallet, ask others nearby if the wallet belongs to them, leave the wallet where it is, or give the wallet to the shop manager. Mr. A can choose one of these four options.

The table below presents a list of the possible choices available to Mr. A. For each of the

	很不得当 Very socially inappropriate	不得当 Somewhat socially inappropriate	较得当 Somewhat socially appropriate	很得当 Very socially appropriate
占为己有 Take the wallet	○	○	○	○
问问附近的人有没有落钱包 Ask others nearby if the wallet belongs to them	○	○	○	○
把钱包留在原处Leave the wallet where it is	○	○	○	○
把钱包交给店长Give the wallet to the shop owner	○	○	○	○

假设某位参与者小周的回答如下:



待所有参与者回答完毕后，有 1/3 参与者被随机选中。如果小周正是其中之一，我们将随机抽取一行行为，将 ta 的答案与该行其他参与者的打分情况进行比较。假设小周被随机抽取到第一行，ta 回答“很不得当”，且其他参与者中，选择“很不得当”的人最多，ta 就能获得额外 50 元奖励。

After all participants finish the questionnaire, suppose Miss Zhou is among those participants randomly selected as eligible to receive bonus payment. We will randomly select one of the rows and compare her answer to others. Suppose, the first row of action is randomly selected; her answer is "very socially inappropriate" and "very socially inappropriate" is chosen by more participants than any other. Miss Zhou will receive additional 50 RMB.

情景 1：小 A 正在宁波市图书馆附近的一家咖啡店里。店里摆放着一块大招牌：“免费巧克力”。小 A 走过去，原来是一所大学在做宣传，桌上放了很多很多巧克力，是很便宜的那种。请判断以下每一种行为是否在社会上被认为是得当的。

“在社会上被认为是得当的”行为，指大多数人认为是“正确”或“合乎道德”的行为。换言之，如果小 A 选择了一个“不得当”的行为，那么其他人可能会因为 ta 的行为而生气。

Scenario 1: Mr. A is at a coffee shop near Library of Ningbo. While there, Mr. A notices that there is a big sign saying "Chocolates for free". When approaching, Mr. A finds that it's a marketing campaign for a university and there are abundant chocolates on the table. The chocolates are of low-value.

The table below presents a list of the possible choices available to Mr. A. For each of the choices, you will be asked to indicate whether you believe choosing that option is very socially inappropriate, somewhat socially inappropriate, somewhat socially appropriate, or very socially appropriate.

By socially appropriate, we mean behaviour that most people agree is the "correct" or "ethical" thing to do. Another way to think about what we mean is that if Mr. A were to select

a socially inappropriate choice, then someone else might be angry at him for doing so.[矩阵单选题] *

	很不得当 Very socially inappropriate	不得当 Somewhat socially inapproriate	较得当 Somewhat socially appropriate	很得当 Very socially appropriate
一颗也不拿 Take nothing	○	○	○	○
拿一颗 Take 1	○	○	○	○
拿两颗 Take 2	○	○	○	○
拿三颗 Take 3	○	○	○	○
拿四颗 Take 4	○	○	○	○
拿五颗 Take 5	○	○	○	○
拿六颗 Take 6	○	○	○	○
拿七颗 Take 7	○	○	○	○
拿八颗 Take 8	○	○	○	○
拿九颗 Take 9	○	○	○	○
拿十颗 Take 10	○	○	○	○

情景 2：小 A 正在宁波市图书馆附近的一家咖啡店里。店里摆放着一块大招牌：“巧克力 1 分钱 1 颗”。小 A 走过去，原来是一所大学在做宣传，桌上放了好多好多巧克力，是很便宜的那种。请判断以下每一种行为是否在社会上被认为是得当的。

“在社会上被认为是得当的”行为，指大多数人认为是“正确”或“合乎道德”的行为。换言之，如果小 A 选择了一个“不得当”的行为，那么其他人可能会因为 ta 的行为而生气。

Scenario 2: Mr. A is at a coffee shop near Library of Ningbo. While there, Mr. A notices that there is a big sign saying "Chocolates for 1 cent each". When approaching, Mr. A finds that it's a marketing campaign for a university and there are abundant chocolates on the table. The chocolates are of low-value.

The table below presents a list of the possible choices available to Mr. A. For each of the choices, you will be asked to indicate whether you believe choosing that option is very socially inappropriate, somewhat socially inappropriate, somewhat socially appropriate, or very socially appropriate.

By socially appropriate, we mean behaviour that most people agree is the "correct" or "ethical" thing to do. Another way to think about what we mean is that if Mr. A were to select a socially inappropriate choice, then someone else might be angry at him for doing so.[矩阵单选题] *

	很不得当 Very socially inappropriate	不得当 Somewhat socially inappropriate	较得当 Somewhat socially appropriate	很得当 Very socially appropriate
一颗也不买 Buy nothing	○	○	○	○
买一颗 Buy 1	○	○	○	○
买两颗 Buy 2	○	○	○	○
买三颗 Buy 3	○	○	○	○
买四颗 Buy 4	○	○	○	○
买五颗 Buy 5	○	○	○	○
买六颗 Buy 6	○	○	○	○
买七颗 Buy 7	○	○	○	○
买八颗 Buy 8	○	○	○	○
买九颗 Buy 9	○	○	○	○
买十颗 Buy 10	○	○	○	○

情景 3：小 A 正在宁波市图书馆附近的一家咖啡店里。店里摆放着一块大招牌：“免费巧克力”。小 A 走过去，原来是一所大学在做宣传，桌上放了好多好多巧克力，是很高级的歌帝梵巧克力。请判断以下每一种行为是否在社会上被认为是得当的。

“在社会上被认为是得当的”行为，指大多数人认为是“正确”或“合乎道德”的行为。换言之，如果小 A 选择了一个“不得当”的行为，那么其他人可能会因为 ta 的行为而生气。

Scenario 3: Mr. A is at a coffee shop near Library of Ningbo. While there, Mr. A notices that there is a big sign saying "Chocolates for free". When approaching, Individual A finds that it's a marketing campaign for a university and there are abundant chocolates on the table. The chocolates are of high-quality that come from Godiva.

The table below presents a list of the possible choices available to Mr. A. For each of the choices, you will be asked to indicate whether you believe choosing that option is very socially inappropriate, somewhat socially inappropriate, somewhat socially appropriate, or very socially appropriate.

By socially appropriate, we mean behaviour that most people agree is the "correct" or "ethical" thing to do. Another way to think about what we mean is that if Mr. A were to select a socially inappropriate choice, then someone else might be angry at him for doing so.[矩阵单选题] *

	很不得当 Very socially inappropriate	不得当 Somewhat socially inappropriate	较得当 Somewhat socially appropriate	很得当 Very socially appropriate
一颗也不拿 Take nothing	○	○	○	○
拿一颗 Take 1	○	○	○	○
拿两颗 Take 2	○	○	○	○
拿三颗 Take 3	○	○	○	○
拿四颗 Take 4	○	○	○	○
拿五颗 Take 5	○	○	○	○
拿六颗 Take 6	○	○	○	○
拿七颗 Take 7	○	○	○	○
拿八颗 Take 8	○	○	○	○

拿九颗 Take 9	○	○	○	○
拿十颗 Take 10	○	○	○	○

情景 4：小 A 正在宁波市图书馆附近的一家咖啡店里。店里摆放着一块大招牌：“巧克力 1 分钱 1 颗”。小 A 走过去，原来是一所大学在做宣传，桌上放了好多好多巧克力，是很高级的歌帝梵巧克力。请判断以下每一种行为是否在社会上被认为是得当的。

“在社会上被认为是得当的”行为，指大多数人认为是“正确”或“合乎道德”的行为。换言之，如果小 A 选择了一个“不得当”的行为，那么其他人可能会因为 ta 的行为而生气。

Scenario 4: Mr. A is at a coffee shop near Library of Ningbo. While there, Mr. A notices that there is a big sign saying "Chocolates for 1 cent each". When approaching, Mr. A finds that it's a marketing campaign for a university and there are abundant chocolates on the table. The chocolates are of high-quality that come from Godiva.

The table below presents a list of the possible choices available to Mr. A. For each of the choices, you will be asked to indicate whether you believe choosing that option is very socially inappropriate, somewhat socially inappropriate, somewhat socially appropriate, or very socially appropriate.

By socially appropriate, we mean behaviour that most people agree is the "correct" or "ethical" thing to do. Another way to think about what we mean is that if Mr. A were to select a socially inappropriate choice, then someone else might be angry at him for doing so.[矩阵单选题] *

	很不得当 Very socially inappropriate	不得当 Somewhat socially inappropriate	较得当 Somewhat socially appropriate	很得当 Very socially appropriate
一颗也不买 Buy nothing	○	○	○	○
买一颗 Buy 1	○	○	○	○
买两颗 Buy 2	○	○	○	○
买三颗 Buy 3	○	○	○	○

买四颗 Buy 4	○	○	○	○
买五颗 Buy 5	○	○	○	○
买六颗 Buy 6	○	○	○	○
买七颗 Buy 7	○	○	○	○
买八颗 Buy 8	○	○	○	○
买九颗 Buy 9	○	○	○	○
买十颗 Buy 10	○	○	○	○

情景 5：小 A 正在宁波市图书馆附近的一家咖啡店里。店里摆放着一块大招牌：“免费巧克力”。小 A 走过去，原来是一所大学在做宣传，桌上有 10 颗巧克力，是很便宜的那种。请判断以下每一种行为是否在社会上被认为是得当的。

“在社会上被认为是得当的”行为，指大多数人认为是“正确”或“合乎道德”的行为。换言之，如果小 A 选择了一个“不得当”的行为，那么其他人可能会因为 ta 的行为而生气。

Scenario 5: Mr. A is at a coffee shop near Library of Ningbo. While there, Mr. A notices that there is a big sign saying "Chocolates for free". When approaching, Individual A finds that it's a marketing campaign for a university and there are 10 pieces of chocolates on the table. The chocolates are of low-value.

The table below presents a list of the possible choices available to Mr. A. For each of the choices, you will be asked to indicate whether you believe choosing that option is very socially inappropriate, somewhat socially inappropriate, somewhat socially appropriate, or very socially appropriate.

By socially appropriate, we mean behaviour that most people agree is the "correct" or "ethical" thing to do. Another way to think about what we mean is that if Mr. A were to select a socially inappropriate choice, then someone else might be angry at him for doing so.[矩阵单选题] *

	很不得当 Very socially	不得当 Somewhat	较得当 Somewhat	很得当 Very socially

	inappropriate	socially inappropriate	socially appropriate	appropriate
一颗也不拿 Take nothing	○	○	○	○
拿一颗 Take 1	○	○	○	○
拿两颗 Take 2	○	○	○	○
拿三颗 Take 3	○	○	○	○
拿四颗 Take 4	○	○	○	○
拿五颗 Take 5	○	○	○	○
拿六颗 Take 6	○	○	○	○
拿七颗 Take 7	○	○	○	○
拿八颗 Take 8	○	○	○	○
拿九颗 Take 9	○	○	○	○
拿十颗 Take 10	○	○	○	○

情景 6：小 A 正在宁波市图书馆附近的一家咖啡店里。店里摆放着一块大招牌：“巧克力 1 分钱 1 颗”。小 A 走过去，原来是一所大学在做宣传，桌上有 10 颗巧克力，是很便宜的那种。请判断以下每一种行为是否在社会上被认为是得当的。

“在社会上被认为是得当的”行为，指大多数人认为是“正确”或“合乎道德”的行为。换言之，如果小 A 选择了一个“不得当”的行为，那么其他人可能会因为 ta 的行为而生气。

Scenario 6: Mr. A is at a coffee shop near Library of Ningbo. While there, Mr. A notices that there is a big sign saying "Chocolates for 1 cent each". When approaching, Mr. A finds that it's a marketing campaign for a university and there are 10 pieces of chocolates on the table. The chocolates are of low-value.

The table below presents a list of the possible choices available to Mr. A. For each of the choices, you will be asked to indicate whether you believe choosing that option is very

socially inappropriate, somewhat socially inappropriate, somewhat socially appropriate, or very socially appropriate.

By socially appropriate, we mean behaviour that most people agree is the "correct" or "ethical" thing to do. Another way to think about what we mean is that if Mr. A were to select a socially inappropriate choice, then someone else might be angry at him for doing so.[矩阵单选题] *

	很不得当 Very socially inappropriate	不得当 Somewhat socially inappropriate	较得当 Somewhat socially appropriate	很得当 Very socially appropriate
一颗也不买 Buy nothing	○	○	○	○
买一颗 Buy 1	○	○	○	○
买两颗 Buy 2	○	○	○	○
买三颗 Buy 3	○	○	○	○
买四颗 Buy 4	○	○	○	○
买五颗 Buy 5	○	○	○	○
买六颗 Buy 6	○	○	○	○
买七颗 Buy 7	○	○	○	○
买八颗 Buy 8	○	○	○	○
买九颗 Buy 9	○	○	○	○
买十颗 Buy 10	○	○	○	○

情景 7：小 A 正在宁波市图书馆附近的一家咖啡店里。店里摆放着一块大招牌：“免费口罩”。小 A 走过去，原来是一所大学在做宣传，桌上放了好多好多口罩。请判断以下每一种行为是否在社会上被认为是得当的。

“在社会上被认为是得当的”行为，指大多数人认为是“正确”或“合乎道德”的行为。换言之，如果小 A 选择了一个“不得当”的行为，那么其他人可能会因为 ta 的行为而生气。

Scenario 7: Mr. A is at a coffee shop near Library of Ningbo. While there, Mr. A notices that there is a big sign saying "Masks for free". When approaching, Mr. A finds that it's a marketing campaign for a university and there are abundant protective masks on the table.

The table below presents a list of the possible choices available to Mr. A. For each of the choices, you will be asked to indicate whether you believe choosing that option is very socially inappropriate, somewhat socially inappropriate, somewhat socially appropriate, or very socially appropriate.

By socially appropriate, we mean behaviour that most people agree is the "correct" or "ethical" thing to do. Another way to think about what we mean is that if Mr. A were to select a socially inappropriate choice, then someone else might be angry at him for doing so.[矩阵单选题] *

	很不得当 Very socially inappropriate	不得当 Somewhat socially inappropriate	较得当 Somewhat socially appropriate	很得当 Very socially appropriate
一个也不拿 Take nothing	○	○	○	○
拿一个 Take 1	○	○	○	○
拿两个 Take 2	○	○	○	○
拿三个 Take 3	○	○	○	○
拿四个 Take 4	○	○	○	○
拿五个 Take 5	○	○	○	○
拿六个 Take 6	○	○	○	○
拿七个 Take 7	○	○	○	○
拿八个 Take 8	○	○	○	○
拿九个 Take 9	○	○	○	○
拿十个 Take 10	○	○	○	○

情景 8：小 A 正在宁波市图书馆附近的一家咖啡店里。店里摆放着一块大招牌：“口罩 1 分钱 1 个”。小 A 走过去，原来是一所大学在做宣传，桌上放了好多好多口罩。请判断以下每一种行为是否在社会上被认为是得当的。

“在社会上被认为是得当的”行为，指大多数人认为是“正确”或“合乎道德”的行为。换言之，如果小 A 选择了一个“不得当”的行为，那么其他人可能会因为 ta 的行为而生气。

Scenario 8: Mr. A is at a coffee shop near Library of Ningbo. While there, Mr. A notices that there is a big sign saying "Masks for 1 cent each". When approaching, Mr. A finds that it's a marketing campaign for a university and there are abundant protective masks on the table.

The table below presents a list of the possible choices available to Mr. A. For each of the choices, you will be asked to indicate whether you believe choosing that option is very socially inappropriate, somewhat socially inappropriate, somewhat socially appropriate, or very socially appropriate.

By socially appropriate, we mean behaviour that most people agree is the "correct" or "ethical" thing to do. Another way to think about what we mean is that if Mr. A were to select a socially inappropriate choice, then someone else might be angry at him for doing so.[矩阵单选题] *

	很不得当 Very socially inappropriate	不得当 Somewhat socially inappropriate	较得当 Somewhat socially appropriate	很得当 Very socially appropriate
一个也不买 Buy nothing	○	○	○	○
买一个 Buy 1	○	○	○	○
买两个 Buy 2	○	○	○	○
买三个 Buy 3	○	○	○	○
买四个 Buy 4	○	○	○	○
买五个 Buy 5	○	○	○	○

买 六 个 Buy 6	○	○	○	○
买 七 个 Buy 7	○	○	○	○
买 八 个 Buy 8	○	○	○	○
买 九 个 Buy 9	○	○	○	○
买 十 个 Buy 10	○	○	○	○

1140

1141

1142 您的性别 Gender [单选题] *

○女 Female

○男 Male

1143

1144 您的年龄 Age [单选题] *

○18 岁以下 Under 18

○18-28 岁

○29-39 岁

○40-50 岁

○50 岁以上 Above 50

1145

1146 您的家庭年收入（单位：元） Annual household income （Currency: CNY） [单选题] *

○少于 50,000

○50,000-100,000

○100,001-200,000

○200,001-300,000

○300,001-400,000

○400,001-500,000

○超过 500,000

1147

1148 您的受教育程度（包括在读）Education level (including currently enrolled) [单选题] *

○高中或以下 High school or below

○本科 Bachelor's degree

○硕士 Master's degree

○博士及以上 Doctorate degree or above

1149

1150 您的婚姻及家庭状况 Marital and family status [单选题] *

○未婚 Single, never married

○已婚未育 Married or domestic partnership; no kids

○已婚已育 Married or domestic partnership; have kid(s)

○离异 Divorced or separated

○其他 Others

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Appendix B: Complementary results for Study 1

Table B-1. Descriptive summary of subjects in Study 1

	Pooled	**T1**	**T2**	**T3**	**T4**	**T5**	**T6**	**T7**	**T8**
Obs	577	74	73	70	71	76	70	72	71
Gender (%)									
Male	49.74	43.24	49.32	55.71	56.34	50.00	48.57	43.06	52.11
Female	50.26	56.76	50.68	44.29	43.66	50.00	51.43	56.94	47.89
Age (%)									
<18	0.87	0.00	0.00	0.00	1.41	1.32	2.86	0.00	1.41
18-28	42.11	47.30	39.73	37.14	40.85	36.84	50.00	43.06	42.25
29-39	44.89	44.59	46.58	50.00	47.89	47.37	32.86	43.06	46.48
40-50	9.19	6.76	8.22	11.43	9.86	9.21	8.57	12.50	7.04
>50	2.95	1.35	5.48	1.43	0.00	5.26	5.71	1.39	2.82
Income (RMB, %)									
<50,000	6.41	5.41	10.96	5.71	7.04	6.58	7.14	4.17	4.23
50,000-100,000	24.26	20.27	23.29	21.43	23.94	30.26	27.14	23.61	23.94
100,001-200,000	31.02	41.89	28.77	31.43	23.94	28.95	32.86	27.78	32.39
200,001-300,000	23.74	21.62	30.14	28.57	21.13	21.05	21.43	23.61	22.54
300,001-400,000	7.97	4.05	2.74	7.14	8.45	9.21	7.14	16.67	8.45
400,001-500,000	3.29	4.05	1.37	2.86	7.04	0.00	2.86	2.78	5.63
>500,000	3.29	2.70	2.74	2.86	8.45	3.95	1.43	1.39	2.82
Education (%)									
High school or below	6.76	4.05	4.11	4.29	4.23	9.21	4.29	12.50	11.27
Bachelor's degree	83.54	83.78	93.15	90.00	81.69	78.95	81.43	81.94	77.46
Master's degree	9.19	10.81	2.74	5.71	14.08	10.53	14.29	5.56	9.86
Doctorate or above	0.52	1.35	0.00	0.00	0.00	1.32	0.00	0.00	1.41
Marital status (%)									
Single, never married	29.12	24.32	27.40	30.00	28.17	30.26	34.29	31.94	26.76
Married, no kids	10.05	10.81	8.22	5.71	8.45	11.84	11.43	9.72	14.08
Married, have kids	59.62	64.86	64.38	62.86	63.38	52.63	52.86	58.33	57.75
Divorced	0.87	0.00	0.00	1.43	0.00	5.26	0.00	0.00	0.00
Others	0.35	0.00	0.00	0.00	0.00	0.00	1.43	0.00	1.41

1156 Table B-2. Responses in each treatment in Study 1

Consumption level	Very socially inappropriate	Somewhat socially inappropriate	Somewhat socially appropriate	Very socially appropriate
Treatment 1: zero priced abundant low-value chocolates (OBS=74)				
Take nothing	6(8.11%)	16(21.62%)	30(40.54%)	22(29.73%)
Take 1	1(1.35%)	8(10.81%)	27(36.49%)	38(51.35%)
Take 2	1(1.35%)	18(24.32%)	36(48.65%)	19(25.68%)
Take 3	6(8.11%)	19(25.68%)	42(56.76%)	7(9.46%)
Take 4	9(12.16%)	29(39.19%)	31(41.89%)	5(6.76%)
Take 5	16(21.62%)	29(39.19%)	24(32.43%)	5(6.76%)
Take 6	22(29.73%)	35(47.30%)	14(18.92%)	3(4.05%)
Take 7	36(48.65%)	27(36.49%)	8(10.81%)	3(4.05%)
Take 8	43(58.11%)	20(27.03%)	7(9.46%)	4(5.41%)
Take 9	48(64.86%)	14(18.92%)	7(9.46%)	5(6.76%)
Take 10	53(71.62%)	9(12.16%)	9(12.16%)	3(4.05%)
Treatment 2: 1-cent priced abundant low-value chocolates (OBS=73)				
Take nothing	16(21.92%)	16(21.92%)	29(39.73%)	12(16.44%)
Take 1	7(9.59%)	15(20.55%)	24(32.88%)	27(36.99%)
Take 2	6(8.22%)	15(20.55%)	35(47.95%)	17(23.29%)
Take 3	4(5.48%)	20(27.40%)	30(41.10%)	19(26.03%)
Take 4	4(5.48%)	18(24.66%)	36(49.32%)	15(20.55%)
Take 5	4(5.48%)	24(32.88%)	30(41.10%)	15(20.55%)
Take 6	6(8.22%)	23(31.51%)	31(42.47%)	13(17.81%)
Take 7	8(10.96%)	20(27.40%)	28(38.36%)	17(23.29%)
Take 8	17(23.29%)	16(21.92%)	23(31.51%)	17(23.29%)
Take 9	19(26.03%)	20(27.40%)	16(21.92%)	18(24.66%)
Take 10	21(28.77%)	11(15.07%)	15(20.55%)	26(35.62%)
Treatment 3: zero priced abundant Godiva chocolates (OBS=70)				
Take nothing	6(8.57%)	15(21.43%)	24(34.29%)	25(35.71%)
Take 1	0(0.00%)	6(8.57%)	20(28.57%)	44(62.86%)
Take 2	0(0.00%)	14(20.00%)	36(51.43%)	20(28.57%)
Take 3	10(14.29%)	22(31.43%)	33(47.14%)	5(7.14%)
Take 4	14(20.00%)	31(44.29%)	23(32.86%)	2(2.86%)
Take 5	21(30.00%)	34(48.57%)	12(17.14%)	3(4.29%)
Take 6	32(45.71%)	27(38.57%)	10(14.29%)	1(1.43%)
Take 7	41(58.57%)	19(27.14%)	7(10.00%)	3(4.29%)
Take 8	52(74.29%)	9(12.86%)	7(10.00%)	2(2.86%)
Take 9	54(77.14%)	10(14.29%)	3(4.29%)	3(4.29%)
Take 10	55(78.57%)	8(11.43%)	3(4.29%)	4(5.71%)
Treatment 4: 1-cent priced abundant Godiva chocolates (OBS=71)				
Take nothing	19(26.76%)	19(26.76%)	25(35.21%)	8(11.27%)
Take 1	1(1.41%)	26(36.62%)	23(32.39%)	21(29.58%)
Take 2	3(4.23%)	13(18.31%)	35(49.30%)	20(28.17%)
Take 3	5(7.04%)	22(30.99%)	26(36.62%)	18(25.35%)
Take 4	6(8.45%)	19(26.76%)	35(49.30%)	11(15.49%)
Take 5	2(2.82%)	24(33.80%)	32(45.07%)	13(18.31%)
Take 6	9(12.68%)	22(30.99%)	29(40.85%)	11(15.49%)
Take 7	14(19.72%)	18(25.35%)	31(43.66%)	8(11.27%)
Take 8	12(16.90%)	18(25.35%)	27(38.03%)	14(19.72%)
Take 9	17(23.94%)	23(32.39%)	18(25.35%)	13(18.31%)
Take 10	21(29.58%)	15(21.13%)	18(25.35%)	17(23.94%)
Treatment 5: zero priced 10-unit low-value chocolates (OBS=76)				
Take nothing	6(7.89%)	17(22.37%)	19(25.00%)	34(44.74%)
Take 1	2(2.63%)	10(13.16%)	18(23.68%)	46(60.53%)
Take 2	3(3.95%)	12(15.79%)	44(57.89%)	17(22.37%)
Take 3	6(7.89%)	26(34.21%)	37(48.68%)	7(9.21%)
Take 4	12(15.79%)	39(51.32%)	21(27.63%)	4(5.26%)
Take 5	19(25.00%)	42(55.26%)	12(15.79%)	3(3.95%)
Take 6	32(42.11%)	31(40.79%)	10(13.16%)	3(3.95%)
Take 7	42(55.26%)	25(32.89%)	5(6.58%)	4(5.26%)
Take 8	46(60.53%)	22(28.95%)	5(6.58%)	3(3.95%)
Take 9	53(69.74%)	13(17.11%)	7(9.21%)	3(3.95%)
Take 10	60(78.95%)	8(10.53%)	5(6.58%)	3(3.95%)
Treatment 6: 1-cent priced 10-unit low-value chocolates (OBS=70)				
Take nothing	17(24.29%)	17(24.29%)	24(34.29%)	12(17.14%)

Take 1	2(2.86%)	15(21.43%)	25(35.71%)	28(40.00%)
Take 2	2(2.86%)	20(28.57%)	27(38.57%)	21(30.00%)
Take 3	2(2.86%)	14(20.00%)	32(45.71%)	22(31.43%)
Take 4	4(5.71%)	17(24.29%)	30(42.86%)	19(27.14%)
Take 5	2(2.86%)	28(40.00%)	25(35.71%)	15(21.43%)
Take 6	6(8.57%)	25(35.71%)	26(37.14%)	13(18.57%)
Take 7	18(25.71%)	22(31.43%)	16(22.86%)	14(20.00%)
Take 8	17(24.29%)	21(30.00%)	21(30.00%)	11(15.71%)
Take 9	22(31.43%)	22(31.43%)	15(21.43%)	11(15.71%)
Take 10	26(37.14%)	14(20.00%)	14(20.00%)	16(22.86%)
Treatment 7: zero priced abundant masks (OBS=72)				
Take nothing	9(12.50%)	16(22.22%)	25(34.72%)	22(30.56%)
Take 1	0(0.00%)	7(9.72%)	25(34.72%)	40(55.56%)
Take 2	4(5.56%)	19(26.39%)	38(52.78%)	11(15.28%)
Take 3	13(18.06%)	27(37.5%)	29(40.28%)	3(4.17%)
Take 4	18(25.00%)	41(56.94%)	10(13.89%)	3(4.17%)
Take 5	26(36.11%)	36(50.00%)	7(9.72%)	3(4.17%)
Take 6	37(51.39%)	27(37.50%)	6(8.33%)	2(2.78%)
Take 7	51(70.83%)	12(16.67%)	6(8.33%)	3(4.17%)
Take 8	51(70.83%)	12(16.67%)	7(9.72%)	2(2.78%)
Take 9	56(77.78%)	10(13.89%)	4(5.56%)	2(2.78%)
Take 10	57(79.17%)	7(9.72%)	6(8.33%)	2(2.78%)
Treatment 8: 1-cent priced abundant masks (OBS=71)				
Take nothing	21(29.58%)	19(26.76%)	23(32.39%)	8(11.27%)
Take 1	3(4.23%)	14(19.72%)	23(32.39%)	31(43.66%)
Take 2	4(5.63%)	11(15.49%)	40(56.34%)	16(22.54%)
Take 3	2(2.82%)	14(19.72%)	35(49.30%)	20(28.17%)
Take 4	1(1.41%)	24(33.80%)	33(46.48%)	13(18.31%)
Take 5	10(14.08%)	18(25.35%)	28(39.44%)	15(21.13%)
Take 6	10(14.08%)	27(38.03%)	17(23.94%)	17(23.94%)
Take 7	14(19.72%)	21(29.58%)	20(28.17%)	16(22.54%)
Take 8	21(29.58%)	17(23.94%)	19(26.76%)	14(19.72%)
Take 9	27(38.03%)	10(14.08%)	20(28.17%)	14(19.72%)
Take 10	34(47.89%)	9(12.68%)	6(8.45%)	22(30.99%)

Modal responses are highlighted in grey.

Table B-3. Comparisons of *N* between zero price and 1 cent conditions in every context

Amount	**N_zero**	**N_1 cent**	**t**
Benchmark context: abundant low-value chocolates			
0	0.28	0.00	2.58**
1	0.59	0.32	2.83**
2	0.32	0.24	0.92
3	0.12	0.25	-1.50
4	-0.05	0.23	-3.15***
5	-0.17	0.18	-3.70***
6	-0.35	0.13	-5.26***
7	-0.53	0.16	-7.11***
8	-0.59	0.03	-5.68***
9	-0.61	-0.03	-5.12***
10	-0.68	0.09	-6.49***
High-value context: abundant Godiva chocolates			
0	0.31	-0.13	4.01***
1	0.70	0.27	5.03***
2	0.39	0.34	0.57
3	-0.02	0.20	-2.27**
4	-0.21	0.15	-3.91***
5	-0.36	0.19	-6.25***

6	-0.52	0.06	-6.22***
7	-0.60	-0.02	-5.76***
8	-0.72	0.07	-7.88***
9	-0.76	-0.08	-6.63***
10	-0.75	-0.04	-6.31***
Scarce context: scarce low-value chocolates			
0	0.38	-0.04	3.69***
1	0.61	0.42	2.11**
2	0.32	0.30	0.23
3	0.06	0.37	-3.59***
4	-0.18	0.28	-5.09***
5	-0.34	0.17	-5.89***
6	-0.47	0.10	-6.15***
7	-0.59	-0.09	-4.74***
8	-0.64	-0.09	-5.52***
9	-0.68	-0.19	-4.73***
10	-0.76	-0.14	-5.62***
Socially-beneficial context: abundant masks			
0	0.22	-0.16	3.44***
1	0.64	0.44	2.31**
2	0.19	0.31	-1.38
3	-0.13	0.35	-5.43***
4	-0.35	0.21	-6.77***
5	-0.45	0.12	-5.85***
6	-0.58	0.05	-6.38***
7	-0.69	0.02	-6.82***
8	-0.70	-0.09	-5.73***
9	-0.78	-0.14	-5.93***
10	-0.77	-0.18	-4.86***

Two-sample two-tailed t test. ***p<0.01, **p<0.05, *p<0.1. A positive t means the action is more appropriate under the zero price than the 1-cent condition.

Table B-4. Comparisons of N across situations in zero price and 1-cent conditions

	Zero price condition			**1-cent condition**		
Amount	**N_Benchmark**	**N_High value**	**t**	**N_Benchmark**	**N_High value**	**t**
0	0.28	0.31	-0.34	0.00	-0.13	1.18
1	0.59	0.7	-1.42	0.32	0.27	0.46
2	0.32	0.39	-0.82	0.24	0.34	-1.08
3	0.12	-0.02	1.54	0.25	0.2	0.50
4	-0.05	-0.21	1.87*	0.23	0.15	0.96
5	-0.17	-0.36	2.04**	0.18	0.19	-0.16
6	-0.35	-0.52	1.97**	0.13	0.06	0.73
7	-0.53	-0.6	0.74	0.16	-0.02	1.75*
8	-0.59	-0.72	1.49	0.03	0.07	-0.33
9	-0.61	-0.76	1.58	-0.03	-0.08	0.39
10	-0.68	-0.75	0.82	0.09	-0.04	0.97
Amount	**N_Benchmark**	**N_Scarce**	**t**	**N_Benchmark**	**N_Scarce**	**t**
0	0.28	0.38	-1.94	0.00	-0.04	0.37

1	0.59	0.61	-0.34	0.32	0.42	-1.01
2	0.32	0.32	-0.00	0.24	0.30	-0.66
3	0.12	0.06	0.67	0.25	0.37	-1.30
4	-0.05	-0.18	1.63	0.23	0.28	-0.46
5	-0.17	-0.34	1.92	0.18	0.17	0.07
6	-0.35	-0.47	1.38	0.13	0.1	0.28
7	-0.53	-0.59	0.62	0.16	-0.09	2.18**
8	-0.59	-0.64	0.61	0.03	-0.09	1.00
9	-0.61	-0.68	0.75	-0.03	-0.19	1.29
10	-0.68	-0.76	0.98	0.09	-0.14	1.69*
Amount	**N_Benchmark**	**N_Masks**	**t**	**N_Benchmark**	**N_Masks**	**t**
0	0.28	0.22	0.54	0.00	-0.16	1.50
1	0.59	0.64	-0.69	0.32	0.44	-1.16
2	0.32	0.19	1.66	0.24	0.31	-0.69
3	0.12	-0.13	2.84***	0.25	0.35	-1.11
4	-0.05	-0.35	3.60***	0.23	0.21	0.25
5	-0.17	-0.45	3.10***	0.18	0.12	0.60
6	-0.35	-0.58	2.68***	0.13	0.05	0.78
7	-0.53	-0.69	1.80*	0.16	0.02	1.23
8	-0.59	-0.7	1.29	0.03	-0.09	0.99
9	-0.61	-0.78	1.81*	-0.03	-0.14	0.81
10	-0.68	-0.77	1.04	0.09	-0.18	1.89*

Two-sample two-tailed *t* test. ***p<0.01, **p<0.05, *p<0.1. A positive *t* means the action is more appropriate under the former than the latter context.

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Table B-5: How the magnitude of the effect of zero pricing on social appropriateness differs between different contexts

	Mean N in 1-cent condition	Mean N in zero price condition	Difference	Difference in difference
		Benchmark		
q=0	0.005	0.279	0.274	
q=1	0.315	0.586	0.271	
q=2	0.242	0.324	0.082	
q=3	0.251	0.117	-0.134	
q=4	0.233	-0.045	-0.278	
q=5	0.178	-0.171	-0.349	
q=6	0.132	-0.351	-0.483	
q=7	0.160	-0.532	-0.692	
q=8	0.032	-0.586	-0.618	
q=9	-0.032	-0.613	-0.581	
q=10	0.087	-0.676	-0.763	
		High-value context		$[N_H^0(q_i) - N_H^1(q_i)] - [N_b^0(q_i) - N_b^1(q_i)]$
q=0	-0.127	0.314	0.441	0.167
q=1	0.268	0.695	0.427	0.156
q=2	0.343	0.390	0.047	-0.035
q=3	0.202	-0.019	-0.221	-0.087
q=4	0.146	-0.210	-0.356	-0.078
q=5	0.192	-0.362	-0.554	-0.205
q=6	0.061	-0.524	-0.585	-0.102
q=7	-0.023	-0.600	-0.577	0.115
q=8	0.070	-0.724	-0.794	-0.176
q=9	-0.080	-0.762	-0.682	-0.101
q=10	-0.042	-0.752	-0.710	0.053
		Scarce Context		$[N_S^0(q_i) - N_S^1(q_i)] - [N_b^0(q_i) - N_b^1(q_i)]$
q=0	-0.038	0.377	0.415	0.141
q=1	0.419	0.614	0.195	-0.076
q=2	0.305	0.325	0.020	-0.062
q=3	0.371	0.061	-0.310	-0.176
q=4	0.276	-0.184	-0.460	-0.182
q=5	0.171	-0.342	-0.513	-0.164
q=6	0.105	-0.474	-0.579	-0.096
q=7	-0.086	-0.588	-0.502	0.190
q=8	-0.086	-0.640	-0.554	0.064
q=9	-0.190	-0.684	-0.494	0.087
q=10	-0.143	-0.763	-0.620	0.143
		Socially-beneficial context		$[N_B^0(q_i) - N_B^1(q_i)] - [N_b^0(q_i) - N_b^1(q_i)]$
q=0	-0.164	0.222	0.386	0.112
q=1	0.437	0.639	0.202	-0.069
q=2	0.305	0.185	-0.120	-0.202
q=3	0.352	-0.130	-0.482	-0.348
q=4	0.211	-0.352	-0.563	-0.285
q=5	0.117	-0.454	-0.571	-0.222
q=6	0.052	-0.583	-0.635	-0.152
q=7	0.023	-0.694	-0.717	-0.025
q=8	-0.089	-0.704	-0.615	0.003
q=9	-0.136	-0.778	-0.642	-0.061
q=10	-0.183	-0.769	-0.586	0.177

The social appropriateness of taking q_i in the context c under the price of 0 is denoted as $N_c^0(q_i)$, or $N_c^1(q_i)$ at the price of 1 cent. The subscript b, H, S and B refers to benchmark context, high-value context, scarce context and socially-beneficial context, respectively.

Table B-6: Significance test for the difference in magnitude of the effect on social appropriateness across contexts

High-value vs. benchmark (low-value)											
	q=0	q=1	q=2	q=3	q=4	q=5	q=6	q=7	q=8	q=9	q=10
high-value	-0.36	-0.26	0.33	-0.17	-0.30	0.03	-0.21	-0.50*	0.08	-0.10	-0.31
	(-1.20)	(-0.84)	(1.04)	(-0.54)	(-0.95)	(0.09)	(-0.68)	(-1.65)	(0.27)	(-0.35)	(-1.02)
zero	0.73**	0.80**	0.21	-0.43	-0.98***	-1.13***	-1.56***	-2.06***	-1.71***	-1.66***	-1.99***
	(2.43)	(2.56)	(0.67)	(-1.40)	(-3.11)	(-3.60)	(-4.93)	(-6.35)	(-5.33)	(-5.08)	(-5.85)
high_value×zero	0.50	0.70	-0.10	-0.26	-0.24	-0.72	-0.40	0.19	-0.73	-0.53	-0.06
	(1.16)	(1.55)	(-0.24)	(-0.58)	(-0.55)	(-1.63)	(-0.91)	(0.42)	(-1.58)	(-1.11)	(-0.13)
Scarce vs. benchmark (abundant)											
	q=0	q=1	q=2	q=3	q=4	q=5	q=6	q=7	q=8	q=9	q=10
scarce	-0.12	0.25	0.16	0.44	0.17	-0.06	-0.10	-0.68**	-0.31	-0.37	-0.52*
	(-0.39)	(0.81)	(0.50)	(1.37)	(0.53)	(-0.19)	(-0.33)	(-2.23)	(-1.02)	(-1.24)	(-1.72)
zero	0.70**	0.77**	0.20	-0.45	-0.94***	-1.13***	-1.56***	-1.97***	-1.77***	-1.64***	-1.96***
	(2.35)	(2.49)	(0.66)	(-1.44)	(-3.04)	(-3.60)	(-4.94)	(-6.18)	(-5.46)	(-5.04)	(-5.78)
scarce×zero	0.48	-0.02	-0.13	-0.66	-0.68	-0.57	-0.37	0.44	0.16	0.13	0.13
	(1.12)	(-0.04)	(-0.29)	(-1.50)	(-1.55)	(-1.30)	(-0.86)	(1.01)	(0.37)	(0.29)	(0.28)
Socially-beneficial (medical masks) vs. benchmark (non-socially-beneficial, chocolates)											
	q=0	q=1	q=2	q=3	q=4	q=5	q=6	q=7	q=8	q=9	q=10
socially-beneficial	-0.46	0.35	0.20	0.36	-0.14	-0.13	-0.27	-0.36	-0.31	-0.26	-0.61*
	(-1.53)	(1.12)	(0.64)	(1.12)	(-0.46)	(-0.42)	(-0.88)	(-1.19)	(-1.02)	(-0.88)	(-1.96)
zero	0.72**	0.80**	0.21	-0.45	-0.99***	-1.05***	-1.48***	-1.92***	-1.64***	-1.55***	-1.84***
	(2.41)	(2.54)	(0.67)	(-1.45)	(-3.13)	(-3.43)	(-4.76)	(-6.06)	(-5.17)	(-4.82)	(-5.51)
Socially-beneficial×zero	0.34	-0.18	-0.67	-1.18***	-1.08**	-0.82	-0.60	-0.44	0.19	-0.39	0.22
	(0.79)	(-0.40)	(-1.51)	(-2.65)	(-2.39)	(-1.88)	(-1.38)	(-0.99)	(-0.41)	(-0.81)	(0.44)

Ordered logit. Dependent variable: appropriateness rating. The significance test is referring to the interaction term. *z*-statistics are in the parentheses. ***p<0.01, **p<0.05, *p<0.1.

Appendix C: Complementary results for Study 2

Table C-1. Comparing the effect of zero pricing on n across contexts (pure free vs. 1-cent)

	Coef.	Std. Err.	z	P>|z|	[95% Conf.	Interval]
high-value vs. low-value (obs=464)						
pure free	1.05***	0.29	3.60	0.00	0.48	1.63
high-value	1.11***	0.29	3.76	0.00	0.53	1.69
pure free × high-value	-0.70*	0.40	-1.76	0.08	-1.47	0.08
constant	-1.35***	0.22	-5.99	0.00	-1.79	-0.91
scarce vs. abundant (obs=441)						
pure free	1.05***	0.29	3.60	0.00	0.48	1.63
scarce	-0.35	0.37	-0.94	0.35	-1.07	0.37
pure free × scarce	-0.12	0.46	-0.26	0.79	-1.02	0.78
constant	-1.35***	0.22	-5.99	0.00	-1.79	-0.91
socially-beneficial vs. non-socially-beneficial (obs=515)						
pure free	1.05***	0.29	3.60	0.00	0.48	1.63
socially-beneficial	-0.21	0.31	-0.67	0.50	-0.82	0.40
pure free × socially-beneficial	-0.11	0.41	-0.27	0.79	-0.91	0.69
constant	-1.35***	0.22	-5.99	0.00	-1.79	-0.91

Binary logit model. Dependent variable: take (1) or not take (0). The significance test is referring to the interaction term. Only data from the pure free and 1-cent treatments are included. ***p<0.01, **p<0.05, *p<0.1.

Table C-2. Comparing the effect of zero pricing on n across contexts (p & r vs. 1-cent)

	Coef.	Std. Err.	z	P>|z|	[95% Conf.	Interval]
high-value vs. low-value (obs=437)						
p & r	0.96***	0.30	3.22	0.00	0.38	1.55
high-value	1.11***	0.29	3.76	0.00	0.53	1.69
p & r × high-value	-1.66***	0.42	-3.96	0.00	-2.48	-0.84
constant	-1.35***	0.22	-5.99	0.00	-1.79	-0.91
scarce vs. abundant (obs=452)						
p & r	0.96***	0.30	3.22	0.00	0.38	1.55
scarce	-0.35	0.37	-0.94	0.35	-1.07	0.37
p & r × scarce	-1.14**	0.49	-2.34	0.02	-2.10	-0.19
constant	-1.35***	0.22	-5.99	0.00	-1.79	-0.91
socially-beneficial vs. non-socially-beneficial (obs=485)						
p & r	0.96***	0.30	3.22	0.00	0.38	1.55
socially-beneficial	-0.21	0.31	-0.67	0.50	-0.82	0.40
p & r × socially-beneficial	-1.24***	0.46	-2.69	0.01	-2.15	-0.34
constant	-1.35***	0.22	-5.99	0.00	-1.79	-0.91

Binary logit model. Dependent variable: take (1) or not take (0). The significance test is referring to the interaction term. Only data from the p & r and 1-cent treatments are included. ***p<0.01, **p<0.05, *p<0.1.

Table C-3. Comparing $q|q>0$ across price conditions

	t	p-value
Context 1: Abundant low-value chocolates		
pure free *vs.* 1-cent	-7.41***	0.00
p & r *vs.* 1-cent	0.76	0.45
Context 2: Abundant Godiva chocolates		
pure free *vs.* 1-cent	-17.54***	0.00
p & r *vs.* 1-cent	-5.05***	0.00
Context 3: Scarce low-value chocolates		
pure free *vs.* 1-cent	-5.67***	0.00
p & r *vs.* 1-cent	-1.42	0.17
Context 4: Abundant masks		
pure free *vs.* 1-cent	-7.10***	0.00
p & r *vs.* 1-cent	-1.83*	0.08

Two-sample two-tailed t test. ***p<0.01, **p<0.05, *p<0.1. A positive t means takers take more under the former condition than the latter one, and negative the opposite.

Table C-4. Comparing the effect of zero pricing on $q|q>0$ across contexts (pure free vs. 1-cent)

	Coef.	Std. Err.	z	P>|z|	[95% Conf.	Interval]
high-value vs. low-value (obs=185)						
pure free	-1.22***	0.13	-9.64	0.00	-1.47	-0.97
high-value	0.31***	0.09	3.38	0.00	0.13	0.48
pure free × high-value	-0.26	0.16	-1.63	0.10	-0.58	0.05
Constant	1.91***	0.08	24.69	0.00	1.75	2.06
scarce vs. abundant (obs=125)						
pure free	-1.22***	0.13	-9.64	0.00	-1.47	-0.97
scarce	-0.11	0.13	-0.85	0.40	-0.38	0.15
pure free × scarce	-0.08	0.21	-0.36	0.72	-0.49	0.34
constant	1.91***	0.08	24.69	0.00	1.75	2.06
socially-beneficial vs. non-socially-beneficial (obs=146)						
pure free	-1.22***	0.13	-9.64	0.00	-1.47	-0.97
socially-beneficial	0.24**	0.10	2.34	0.02	0.04	0.44
pure free × socially-beneficial	0.14	0.17	0.82	0.41	-0.19	0.47
constant	1.91***	0.08	24.69	0.00	1.75	2.06

Poisson regression. Dependent variable: $q|q>0$. The significance test is referring to the interaction term. Only data from the pure free and 1-cent treatments are included. ***p<0.01, **p<0.05, *p<0.1.

Table C-5. Comparing the effect of zero pricing on $q|q > 0$ across contexts (p & r vs. 1-cent)

	Coef.	Std. Err.	z	P>|z|	[95% Conf.	Interval]
high-value vs. low-value (obs=145)						
p & r	0.10	0.10	1.07	0.28	-0.08	0.29
high-value	0.31***	0.09	3.38	0.00	0.13	0.48
p & r × high-value	-0.60***	0.13	-4.47	0.00	-0.86	-0.33
constant	1.91***	0.08	24.69	0.00	1.75	2.06
scarce vs. abundant (obs=100)						
p & r	0.10	0.10	1.07	0.28	-0.08	0.29
scarce	-0.11	0.13	-0.85	0.40	-0.38	0.15
p & r × scarce	-0.51***	0.19	-2.72	0.01	-0.87	-0.14
constant	1.91***	0.08	24.69	0.00	1.75	2.06
socially-beneficial vs. non-socially-beneficial (obs=109)						
p & r	0.10	0.10	1.07	0.28	-0.08	0.29
socially-beneficial	0.24**	0.10	2.34	0.02	0.04	0.44
p & r × socially-beneficial	-0.38**	0.15	-2.46	0.01	-0.68	-0.08
constant	1.91***	0.08	24.69	0.00	1.75	2.06

Poisson regression. Dependent variable: $q|q > 0$. The significance test is referring to the interaction term. Only data from the p & r and 1-cent treatments are included. ***p<0.01, **p<0.05, *p<0.1.

Table C-6. Comparing the aggregated demand across price conditions

	$\bar{q}$	T	p-value
Context 1: Abundant low-value chocolates			
pure free *vs.* 1-cent	0.85 vs. 1.39	-1.66*	0.10
p & r *vs.* 1-cent	3.02 vs. 1.39	3.23***	0.00
Context 2: Abundant Godiva chocolates			
pure free *vs.* 1-cent	1.10 vs. 4.03	-6.15***	0.00
p & r *vs.* 1-cent	1.58 vs. 4.03	-4.29***	0.00
Context 3: Scarce low-value chocolates			
pure free *vs.* 1-cent	0.52 vs. 0.93	-1.48	0.14
p & r *vs.* 1-cent	0.53 vs. 0.93	-1.30	0.20
Context 4: Abundant masks			
pure free *vs.* 1-cent	1.02 vs. 1.49	-1.30	0.20
p & r *vs.* 1-cent	0.89 vs. 1.49	-1.50	0.14

Two-sample two-tailed t test on q. ***p<0.01, **p<0.05, *p<0.1. A positive t means subjects take more under the former condition than the latter one, and negative the opposite.

Table C-7. Comparing the aggregated effect (q) across contexts (pure free vs. 1-cent)

	Coef.	Std. Err.	z	P>|z|	[95% Conf.	Interval]
high-value vs. low-value						
pure free	-0.50***	0.13	-3.91	0.00	-0.74	-0.25
high-value	1.06***	0.09	11.77	0.00	0.89	1.24
pure free × high-value	-0.81***	0.16	-4.98	0.00	-1.12	-0.49
constant	0.33***	0.08	4.25	0.00	0.18	0.48
scarce vs. abundant						
pure free	-0.50***	0.13	-3.91	0.00	-0.74	-0.25
scarce	-0.40***	0.13	-2.97	0.00	-0.66	-0.14
pure free × scarce	-0.09	0.21	-0.40	0.69	-0.50	0.33
constant	0.33***	0.08	4.25	0.00	0.18	0.48
socially-beneficial vs. non-socially-beneficial						
pure free	-0.50***	0.13	-3.91	0.00	-0.74	-0.25
socially-beneficial	0.07	0.10	0.69	0.49	-0.13	0.27
pure free × socially-beneficial	0.11	0.17	0.67	0.51	-0.22	0.44
constant	0.33***	0.08	4.25	0.00	0.18	0.48

Poisson regression. Dependent variable: q. The significance test is referring to the interaction term. Only data from the pure free and 1-cent treatments are included. ***p<0.01, **p<0.05, *p<0.1.

Table C-8. Comparing the aggregated effect (q) across contexts (p & r vs. 1-cent)

	Coef.	Std. Err.	z	P>|z|	[95% Conf.	Interval]
high-value vs. low-value						
p & r	0.78***	0.10	8.15	0.00	0.59	0.96
high-value	1.07***	0.09	11.77	0.00	0..89	1.24
p & r × high-value	-1.72***	0.13	-12.88	0.00	-1.98	-1.45
constant	0.33***	0.08	4.25	0.00	0.18	0.48
scarce vs. abundant						
p & r	0.78***	0.10	8.15	0.00	0.59	0.96
scarce	-0.40***	0.13	-2.97	0.00	-0.66	-0.14
p & r × scarce	-1.34***	0.19	-7.16	0.00	-1.70	-0.97
constant	0.33***	0.08	4.25	0.00	0.18	0.48
socially-beneficial vs. non-socially-beneficial						
p & r	0.78***	0.10	8.15	0.00	0.59	0.96
socially-beneficial	0.07	0.10	0.69	0.49	-0.13	0.27
p & r × socially-beneficial	-1.29***	0.16	-8.36	0.00	-1.60	-0.99
constant	0.33***	0.08	4.25	0.00	0.18	0.48

Poisson regression. Dependent variable: q. The significance test is referring to the interaction term. Only data from the p & r and 1-cent treatments are included. ***p<0.01, **p<0.05, *p<0.1.

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