# Change In Actual Sizes and Size Labels

## How do people choose soft drink sizes?

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# Table of Contents

**Abstract:** Obesity and overweight are becoming an urgent issue in more and more countries. At the same time, the past decade has witnessed an increase in the size of food portions, which is often accused of being partially responsible for the trend of increasing weight. This paper puts focus on soft drinks and investigates the effect of actual sizes and size labels on consumers' choices. An experiment in the form of questionnaires was conducted among students from Erasmus University of Rotterdam. The results prove partially the author's hypotheses: people are not completely unaware of the actual size changes, but downsizing the choice portfolio in actual sizes can induce choosing smaller actual sizes owing to the middle option bias. Moreover, changing the size labels (i.e. upsizing size labels) leads to behavior alteration, where more people choose smaller actual sizes, although the shift is not statistically significant. Overall, it supports the hypothesis that consumers are not rational in choosing drink sizes, as they are largely influenced by the portfolio of actual sizes available.

## 1. Introduction

It is no surprising news that people have become more and more overweight since the past decades. The leading economy in the world, the U.S., is ranked as the first place, being the most severely obese country (OECD, 2012). Among American adults aged 20 or older, close to 70% of the whole population is reported as overweight and the obesity rate[1] reaches the striking rate of 35% in 2010 (CDC, 2012; Flegal, Carroll, Kit, & Ogden, 2012). Other developed countries are not too far behind. Among OECD countries, England follows closely behind the U.S., having around 63% of the adult population overweight and for Canada; this number is 53% (OECD, 2012). In the Netherlands, where the population is usually seen as to eat much healthier than its wealthy counterparts, still over 40 percent of the Dutch population is moderately to severely overweight and the obesity rate among adults has more than doubled since the last three decades, according to new data from Statistics Netherlands 2012 (CBS, 2012). Moreover, what is also worrying is the fact that developing countries are also catching up in terms of obesity. According to a WHO report (Consultation, 2000), due to undergoing fast economic development, countries like China and India which are considered to have relatively low overweight prevalence, are also experiencing a dramatic increase in obesity rate. The worsening issue of obesity is more serious than people presume, since it does not only cause individual inconvenience but also impose a large burden on the society, by raising healthcare expenditure. According to a report by the OECD, (2012), obesity is estimated to be responsible for 1% to 3% of total healthcare expenditure in most OECD countries (5% to 10% in the United States) and costs will rise rapidly in the coming years as obesity related diseases set in.

Along with heavier people, the past decades also witnessed a dramatic increase in the food portion sizes they consume daily (Hill, Wyatt, Reed , & Peters , 2003). In fact, there is a recognized understanding that the increasing food portion plays a role in the overweight issue in the population (Nielsen & Popkin, 2003). As the plates become larger, people also eat unnecessarily more, which contributes to weight gain. It is especially

[1] Overweight is defined as having a BMI index between 25 and 30; Obese is defined to having a BMI equal to or higher than 30.

worth noting that among various unhealthy food types that have enlarged the sizes, soft drinks or sweetened beverages account for the largest proportional size increase in the context of fast food industry (Nielsen & Popkin, 2003). Compared with the soft drink size available 60 years ago, the current size is astonishingly six times larger (CDC, 2012). Moreover, it has been commonly agreed that soft drinks give rise to severely bad health consequences, including not only weight gain, but also diabetes and other obesity-related health issues (Malik, Schulze, & Hu, 2006). Investigated in a large sample of European adults, The InterAct consortium (2013) reveals that a 12 ounce (about 355 ml) can of soft drink, or soda, a day was associated with a 20% increase in the risk of developing diabetes.

In this context of increasing obesity and larger drink sizes, we wonder: are consumers aware of the change in actual sizes of soft drinks over time? How do these changes have influence on consumer choices? Do people make rational choices? Are their choices affected by other factors, such as size labels? Can we trigger consumers to make smarter choices with the understanding of their consumption behavior? Aiming at answering these questions, the paper investigates how actual sizes and size labels influence consumers' choices respectively. Actual sizes, also as referred to drink sizes, measure the amount of drinks in terms of unified measurement, such as milliliters or liters. Thus, the actual size of the drink is an objective and absolute measurement for drink sizes. Size labels (e.g. "small-medium-large") describe sizes from a subjective and relative perspective. Though both terms mean to describe sizes, size labels are subject to consumers' own interpretation. For example, one person may interpret the size label "small" as any drink that is smaller than 500ml while another one thinks it simply means one size smaller than the medium size label. Conventionally, actual sizes and size labels correlate highly with each other: larger actual sizes are associated with larger size labels. However, the relationship is neither unified nor strictly defined, as seen in the fast food industry (Thompson & Vedantam, 2012).

How do people react to change in actual sizes and size labels? Under the assumption of rationality, consumers should only consider actual sizes while making choices or consumptions. They should also have a clear and stable preference over the amount of the

drinks (actual sizes) they would like to consume. When available actual sizes change, rational consumers are conscious about the change and choose according to their own preference. Thus, size labels should not influence a rational consumer on which actual sizes to choose. However, many have argued that people do not act as rational as neoclassical economists claim (Kahneman, 2003; 2011) and they are subject to various biases. For example, people are not good at estimating actual sizes. Owing to this, they may not be well aware of the actual size changes or make decisions using alternative hints such as size labels. Also, some studies indicate that people have a tendency to choose the middle option. This means people who choose the middle option will stay with the middle option even when the whole choice set is downsized (or upsized), which according to neoclassical economic theories is not possible.

With neither side of the arguments being conclusive, the author conducted a questionnaire-based experiment. It firstly investigates the actual size effect by introducing two choice sets of drinks where one of them is downsized. Secondly, it examines how or to what extent do size labels have influence on consumer choices, controlling for actual sizes. Based on the results, the paper attempts to answer the question: do people act rationally, or not at all? To the author's best knowledge, this paper is the first to investigate the actual size effect in the context of choice portfolios (i.e. choosing from several options). Other literature, such as the study from Rolls, Morris, & Roe, (2002), typically sets the experimental environment where participants are offered only one certain size of food at a time and thereafter measures their consumption. Moreover, this paper innovatively differentiates the effect of size labels from actual sizes whereas in most papers the two terms are not distinguished explicitly.

In the next part of the paper, some relevant concept and literature will be discussed and hypothesis of the study will be made. Afterwards the paper will describe the experimental design and present the results. This is followed by the section of conclusion and discussion. We finalize the paper with possible implication for policy makers and consumers.

## 2. Actual sizes and size labels

The current study intends to explore the influence of actual sizes and size labels on the choice of soft drink size. Prior to the study, much literature and experiments have already shown great insights in both or one of the two areas. Thus in this section, the paper will discuss some relevant literature and show relations to the current study.

Rationally, when considering buying a drink, consumers should have a clear prior knowledge of how much they want to consume. The preferred amount is chosen by the individual which gives him the highest utility at that moment depending on his level of thirst. According to neoclassical economic theories, consumers are rational thus should meet certain assumptions. For example, consumers have perfect information about all options and free from any biases. As a result, their preferred amount should not be influenced by external factors such as the shape of the cups or the size labels, since they do not provide additional information on the actual sizes. Thus, a rational consumer should have a stable preference over the actual size of drinks and should not be influenced by size labels.

However, in reality we find some evidence stating that consumers do not make rational choices. We discuss several aspects that support this argument.

Firstly, consumers are not certain about how much they want when it comes to choose food or drinks. Furthermore, how much people consume can be influenced largely by its portion size, package size as well as container size. Various experiments have presented that larger portion sizes induce higher intake since people in general tend to eat what is put in front of them (Sharpe, Staelin, & Huber, 2008). For example, Brian & Kim (2005) demonstrated that large packages can lead to overeating even when the food, which is popcorn in this case, is not palatable. Another study by Marchiori, Corneille, & Klein (2012) makes a distinction between portion size and container size and shows that not only larger portion size, but larger container alone can also largely increase consumer intake despite holding portion size constant. Some other experiments take an unconventional view on this relationship between size and consumption and provide us some paradoxical findings that small packages can sometimes lead to more consumption

as well. In essence, as Coelho Do Vale, Pieters, and Zeelenberg (2008) argues, it is because consumers see small packages as harmless thus eat with less caution which in the end leads to more intake.

Secondly, consumers are not so accurate at estimating sizes. In fact, it has been increasingly recognized that human's eyes are in general not trustworthy (Bruce, 2012; Kuhn & Land, 2006). When it concerns food or drink, consumers' estimation on sizes are easily manipulated by other factors such as size labels, packaging and container size (Marchiori, Corneille, & Klein, 2012). For example, people have biases in the perception of volume due to container shape (Raghubir & Krishna, 1999). It is revealed that people simply use container height as a visual cue for the perceived volume. The height of the container affects the perceived volume positively even when controlling for actual volume. Or as illustrated by Smith & Ditschun (2009), people tend to regard a tall, slender glass as holding more volume than a short, wide glass even though both glasses hold the same volume. These systematic biases are strikingly consistent and even resist after consumers are confronted with them (Ariely, 2009).

Thirdly, even provided with size information (e.g. actual size), consumers do not process it effectively when making decisions. It is argued by Krishna & Aydinoğlu (2010) that when making frequent food consumption decisions, such as deciding which drink to purchase when visiting restaurants and cinemas, consumers are likely to depend on heuristic processing instead of a systematic processing under the framework of Heuristic-Systematic Model (Chaiken, 1980) to access relevant information. The Heuristic Systematic Model (HSM) is typically used to explain how people receive and process persuasive messages but also applies more generally as the information processing model. Under HSM there are two possible ways of processing messages: heuristic and systematic processing. Under heuristic processing, cognitive effort exerted from the subject is minimized and involvement over the issue is low while under systematic processing, people utilize all relevant informational input available and analyze it comprehensively.

For frequent decisions such as buying soft drinks, it is likely that people have low degree of involvement and are not willing to employ too much cognitive effort. This means that they are not very motivated to be accurate in their size judgment. At the same time, given the size information (even the actual size), it is still not easy for consumers to estimate the size. It is hard for them to imagine how much an absolute amount of 16.9oz/500ml is. Thus, consumers lack the motivation as well as the ability to accurately estimate the size using size information. As a result, they tend to resort to semantic cues, such as size labels or other verbal descriptions (Krishna & Aydinoğlu, 2010). Size labels, such as "small" and "medium" which gives relative size directions instead of absolute amounts, may offer an easier way for consumers to interpret and visualize. This coincides with the view of Mr. Wansink who explains in his book (Wansink B. , 2010) that in a large number of occasions when people choose and eat food, they do it mindlessly. Owing to this, eye-catchy signs, easy to understand labels would be more likely to be noticed and used for decision making. On the contrary, size information (e.g. actual size) would not be processed effectively or even ignored by consumers.

Lastly, when it concerns a choice set where consumers have to make decisions among multiple ordered options, some research has presented the so-called extremeness aversion effect (Sharpe, Staelin, & Huber, 2008), where people tend to avoid the extreme options. Similarly, the middle option bias mentions that in general people tend to choose the middle option regardless of the choice set options, called by (Paul, Astrid, & Jordana, 2012) also as the central-stage effect. In their study, it was found that they preferred pictures in the center rather than at either end when participants were presented with a line of five pictures, no matter if it was arranged horizontally or vertically. Accordingly, in face with three options to choose, people should have a clear preference over the second thus the middle option.

Based on the arguments and supported studies together with our research questions, we propose the following hypothesis for the current study:

**H1:** Consumers are not rational in choosing drink sizes.

**H2a:** Consumers are insensitive to actual size changes. When a drink portfolio is downsized in terms of actual sizes while keeping size labels unchanged, their distribution with regards to the size labels remain the same.

**H2b:** Consumers are subject to middle option bias. When a drink portfolio is downsized in terms of actual sizes while keeping size labels unchanged, they consistently prefer the middle option regardless of the available actual sizes.

**H3:** People's choices are influenced by size labels. When the drink portfolio is upsized in size labels, while keeping actual sizes available unchanged, their choices in terms of actual sizes should be different.

To the author's best knowledge, most literature investigating the actual size effect predetermines one size of food for each treatment group and measure the difference in consumption between treatments. For example, in the experiment from Rolls, Morris, & Roe (2002), each subject was offered with one of four portions of the entrée meal and their consumptions were measured and compared afterwards. The current paper however designs the experiment in a different manner: it offers a portfolio of drink sizes for each treatment group and thereafter compares change in choices instead of consumption. In the author's opinion, presenting participants with a full set of drink options makes the experiment closer to the real setting in the current market so that the observed results can be easily interpreted and applied not only in the lab setting but also into the external environment. Additionally, there is currently limited amount of research that separate the influence of size labels from actual sizes on unhealthy food choices. Among the few, Krishna & Aydinoğlu, (2010) is to the author's opinion the most relevant in this issue. They investigated the asymmetric effect of size label on perceived size and consumption by altering size labels (e.g. small, medium etc.) while keeping their actual size constant. The paper revealed that size labels can influence perceived size as well as perceived and actual consumption because people are greatly influenced (even unconsciously) by the information of size labels when forming size judgment. However, it is not yet explored how size labels will affect consumer choices when a set of drink portfolio is presented.

Thus, the current study distinguishes itself by introducing the choice portfolio setting in the experiment which is more commonly seen in the market and is the first one to vary two factors, namely drink size and size labels independently from each other in a choice set setting.

# 3. Experimental design

## 3.1. Subjects

In total 156 participants participated in the experiment. All participants are students from Erasmus University Rotterdam, the Netherlands. Most of the students are studying in their first and second year of bachelor and twenty of them are master students of marketing program at Erasmus School of Economics. The average age of the participants is 20.6 years old. On average, the master students who filled in the survey are 2 years older than those from bachelor. However, there is no salient belief that master students should be different in behavior from the bachelors significantly. All respondents were invited via email or messages with a website link directing them to the survey. All the participants were kept anonymous and they did not have access to answers of others. Their responses thus can be seen as independent from each other.

## 3.2. Manipulation

The first manipulation in the experiment is the actual sizes in the choice portfolio available and the second is the size labels available. Two manipulations need to be conducted separately so that the experiment is controlled. Thus, the study introduced one base group and two treatment groups. In each group, a choice set of three different drink sizes was provided. All drinks were presented as in cups and their actual sizes (in milliliter) as well as size labels are presented clearly on the cup. Participants are then asked accordingly to choose only one size out of the three. The base group, as the name indicates, is the group that reflects a baseline behavior. The base group contains a choice set of three different sizes which are in line with the currently available sizes in the

market such as fast food chains. The two treatment groups vary in actual sizes and size labels respectively compared with the base group. More specifically, keeping the size labels in the drink portfolio unchanged, each cup in treatment 1 is smaller in actual sizes than the corresponding one with the same size label in the base group. In other words, the whole choice set in treatment 1 is downsized compared with the base group. In treatment 2 group, the actual sizes of the drinks are identical to those of the base group. Yet, the size labels are manipulated such that instead of from *small* to *large*, the size labels are changed into from *Medium* to *Extra-large*. In this way, all drinks are "upsized" in their size labels. It is also possible to reverse the direction of the manipulation, thus upsizing the actual sizes and downsizing the size labels. However, in the context of the obesity issue and increasing soft drink sizes as discussed in the introduction section, it is of more interest to observe consumers' behavior with the author's attempt to downsize their choices of drink sizes. In all three groups, number of choices is kept all at three thus constant. This is to eliminate any unwanted bias accompanied with the difference in the number of choices, thus minimizing confounding effect. To have an overview of the label and sizes in three groups, see table 1. The discussion about the determination of prices and sizes are presented in the following section.

Table 1: Summary of three treatment conditions

| | 1 | 2 | 3 |
|---|---|---|---|
| ***Base Group*** | S | M | L |
| | 250ml | 400ml | 500ml |
| **Price(€)** | 1.90 | 2.50 | 2.90 |
| ***Treatment 1*** | S | M | L |
| | 200ml | 250ml | 400ml |
| **Price(€)** | 1.70 | 1.90 | 2.50 |

| | | | |
|---|---|---|---|
| ***Treatment 2*** | M | L | XL |
| | 250ml | 400ml | 500ml |
| **Price(€)** | 1.90 | 2.50 | 2.90 |

In the current study, between-subjects design is adopted. As the consequence, this requires more respondents compared with adopting within-subjects design. However, the advantage is that since each respondent only answers from one group instead of all three, the overall results between the groups are independent. In contrast, a within-subjects design will result in dependent answers among three treatment groups. If respondent's decisions of choices are based on previous ones, leading to the so-called learning effect, it will not reflect their real intention and behavior, providing us with confounded data.

## 3.3. Questionnaire Setup

In the study, a questionnaire is used instead of applying the study in a real life setup, due to practical reasons. Since there is no explicit monetary payoff in this experiment to the participants, incentives for participants to report their real intention is very low. Rationally, they would not exert any effort in answering or giving honest answers. For this reason, a virtual road-trip setting is applied in the questionnaire where realistic pictures are shown and a very detailed story is made up to make the survey more realistic. As shown in the paper by Sharpe, Staelin, & Huber (2008), applying road trip method can effectively elicit consumers' actual intention and purchasing behavior as the outcome obtained from road trip experiment does not differ from what they choose in the reality significantly. By helping participants vividly visualize the story , participants are expected to think and make decisions in the same way as they do in the real situation. Hence, the incentive issue is alleviated.

In the road trip, a cinema setting is applied. Using a cinema setting can simplify the purchasing process as normally people consider buying only two types of products: soft drink and/or popcorn while in fast food restaurants there are significantly more varieties.

Currently in the Netherlands, soft drinks are usually served either in a container such as a cup or in bottles. Soft drink in cups is more commonly seen in major fast food restaurant or café restaurants while in the cinemas they are usually sold in bottles. In the experiment, we adopted the cup format instead of bottles, which are also applied in most studies with similar topics. Consumers, especially the study's target group- the young aging between 18 to 30 year old- should be familiar with soft drink in cup format in the cinema due to influence via media or own experience from influential countries such as the United States and the United Kingdom.

In the questionnaire, firstly participants are welcomed and thanked for taking their time and then a real-life setting is introduced. More specifically, participants are asked to imagine that they are going to the cinema to watch a movie and before movie starts they can buy some drinks and/or popcorn. In each step, pictures such as photos in front of the cinema and food counter are provided which help for imagination. To limit prior experience with any cinema in deciding soft drink sizes, the cinema shown in the picture is an unfamiliar one to the sample participants and is not associated with any well-known cinemas. When they are in front of the counter, they are asked to decide which drink they would like to buy out of five choices which are all common soft drink types.

Afterwards the treatment question is presented. Participants are asked to choose which size of their chosen drink they would like out of three options. All three options are shown in the picture format. The line of products is arranged horizontally. To help respondents visualize the actual size of drinks and popcorn, an iPhone 4s is put next to each cup. In the picture, as all cups will be smaller than their actual sizes, the iPhone is also resized to assure its relative size with the cups. As mentioned in the section of manipulation, a between-subjects experiment design defines that each participant will only be facing with one treatment. To ensure this, the questionnaire will present to each participant only one of the drink portfolios (as summarized in Table 1) thus assigning only one treatment to the participant. This treatment is assigned randomly by the questionnaire software[2].

[2] For more information about how the randomization of treatments is done, see www.qualtrics.com .

After the main question is answered, to make the story complete, they are also asked to choose which popcorn flavor they would like and which size; in the same manner as choosing the soft drinks: three different sizes are shown with prices underneath the products. Each popcorn bowl is also accompanied by an iPhone 4s. However, no size label is indicated. Note that the survey deliberately asks the question of choosing soft drinks prior to that of choosing popcorns. In this way, decision for soft drinks which are this study's focus will not be dependent on or influenced by that of choosing popcorn, if there could be any. With the completion of the visual road trip, participants are also required to answer some additional questions. These include some basic demographic information such as gender and age. In addition, one question concerning their motive of making choices is asked: "What is your decision of soft drinks size based on?" The result can be used to analyze their perception and behaviors combined with their intended consumption. For a complete view of the questionnaire, see in Appendix B.

In the following paragraphs, several considerations about the questionnaire setup will be discussed, including cup sizes and design, price setting and reference sizes.

*Cup sizes and design.* Since cinemas in the Netherlands (mainly dominant by Pathe[3]) currently serve drinks not in cups but in bottles, we refer mainly to the sizes available in the fast food chains in the Netherlands. Thus, sizes in the experiment mirror the ones in the fast food chains, which range from 250ml to 500ml. All the cups used in the picture originally come from McDonald's. As explained in previous section, cup sizes in the base group are the ones commonly available in the market. Currently at major fast food chains, such as McDonald's, KFC and Burger King, their cup sizes are 250ml, 400ml and 500ml[4]. Thus, they are set as our base group sizes. The size labels for the base group are *small*, *medium* and *large* respectively. For the treatment 1 group where the actual sizes are downsized, the sizes are set as 200ml[5], 250ml and 400ml. In the treatment 2 group, as explained before, only the size labels differ from those of base group while keeping other factors unchanged. On the cup all the other pictures and letters (e.g. logo of coca cola) are

[3] See website: www.Pathe.nl
[4] Burger King has one XXL size besides these three sizes which is 750ml.
[5] This size is not readily available in fast food chains, but is seen in some restaurants or bars (e.g. Vapiano). According to the Netherlands Nutrition Centre, this size is the closest to the reference serving of 7.6 oz.(Vermeer et al., 2010)

erased so that there will be no association of any brand (i.e McDonald's) that may influence participants' choices. Information of the actual sizes in milliliter is kept on the cups. People who are rational and make decision by the actual amount in each cup should be able to see it on the cup. With regards to the size labels, they are put on roughly the center of the cup, noticeably. For a complete outlook of the cup design, see graph 1 in Appendix.

*Price.* In the experiment, the price for each cup is presented to the respondents, depending on their actual sizes. It is reasonable to argue that when respondents are asked to make a choice from different sizes of drinks without any indication of prices, they would prefer to choose larger sizes as all drinks are regarded as "free". Thus, providing prices for each choice will to some extent lead respondents to think more in terms of "which one to buy" instead of "which one to choose" thus triggering their real intention. However, since the price affect is not our main concern, we would not want the participants to choose under any budget constraint. For this reason, a question is asked after the road trip about what is the decision based on and one answer that "I have a maximum amount of money to spend" is included.

In determining the price, there is also much to consider. Not all the sizes of drinks used in the experiment have readily available prices in the cinema. As mentioned in the previous paragraph, current cinemas in Rotterdam area serve only 400ml and 500ml[6]. To determine the price for those sizes in the experiment that are not readily available, we could mirror the price setting in the fast food restaurants to that in the experiment. The most common method of setting price in the fast food restaurants is the so-called value size pricing. Under this price setting, unit prices (i.e. price per gram/milliliter) for large actual sizes are lower than for small sizes. This price setting can induce people to choose larger sizes as larger drinks have higher value for money (Vermeer & Alting, 2009). Another method in setting price is to ensure a constant per unit price. Though, studies have shown that consumers do not consider unit price when making choices (Krishna & Aydinoğlu, 2010). This may also be the reason why the study by Vermeer & Alting (2009) proposing this method does not have the significant results in reducing consumers'

[6] Pathe also serves 1L drinks, but it is in general not for only one person.

size choices. Alternatively, we propose another method. Similarly to the idea of constant per unit price, it preserves per unit price for the difference in volume to be the same across all sizes. That is, increasing the size by 50ml costs always the same amount of money, regardless of their sizes. In this way, the value for money motivation is mitigated. They will make decisions based on actual sizes and/or size labels which are our main concerns while keeping the price factor in mind.

*Reference sizes.* Due to the fact that all drinks are shown in pictures, their realness is impaired which gives difficulties for people to imagine the size. Therefore, a reference size is provided in order to help the respondents visualize the actual size. This coincides with the paper by Vermeer, et al., 2010, where a dice is put next to each cup and functioned as the reference size. However, the author argues that since the dice is too small compared with the cup, it does not serve the purpose well. In the current study, an iPhone 4s is used instead as a reference size. It is more comparable with the soft drink cups. Moreover, to our target group who are mainly between 18 and 30 years old, the size of an iPhone 4s should be very commonly recognizable.

## 3.4. Data Analysis

As respondents are asked to choose one drink size out of three, the results thus are in the form of choice decision. Although no explicit utility can be measured, relative value of utilities can be shown. When a choice is made, it indicates that the choice gives the respondent a higher utility than the other two options.

To investigate the effect of actual size change on people's choices, the paper compared the base group and treatment 1 group. If, as the author hypothesizes in H2a, people are not sensitive to actual sizes changes then we should observe the same distribution of choices regarding size labels between the two groups. That is, although the *small* labeled cup changes from 250ml in base group to 200ml in treatment 1, there is still the same proportion of people in two groups who choose *small* and the same goes for the other two size labels. Moreover, to test H2b hypothesis, we are to investigate the distribution of the three options in each portfolio and test whether participants always prefer the middle option over the other two.

On the contrary, if people are rational, their preferences over actual sizes are stable and fixed. In the experiment, as participants are randomly assigned into the base group and the treatment 1 group, the preferences over actual sizes between two groups should not differ with each other. It means that there should be the same distribution of their choices over the four actual sizes: 200ml, 250ml 400ml and 500ml, between the two groups. Since the choices in the portfolio are restricted by the experimenter, people who would like to choose 200ml in the base group have to resort to the closest size available which is 250ml. Similarly, as 500ml is excluded from the portfolio in treatment 1, participants who would prefer this amount will choose 400 instead. Overall, we are ought to observe that the proportion of people choosing 250ml in the base group should be equal to the summation of proportions of people choosing 200ml and 250ml in treatment 1 group thus will be larger than the ratio of which people pick 250ml only. Similarly, the proportion of people who choose 400ml in the treatment 1 group should be the same as the sum-up of the ratio of people choosing 400ml and 500ml in the base group thus will be larger than the ratio of which people choose 400ml alone. This is all illustrated in Table 2. As argued above, if consumers are fully rational we should observe that $a_1 = p_1 + p_2$=$b_1 + b_2$ thus $a_1 > b_2$ and $b_3 = p_2 + p_3 = a_2 + a_3$ thus $b_3 > a_2$. We will adopt the probit and ordered probit regression model as well as Mann-Whitney U test to test these suppositions.

Table 2. Distribution illustration for Base Group and Treatment 1 group

| **Actual sizes (ml)** | **200** | **250** | **400** | **500** | **Sum** |
|---|---|---|---|---|---|
| **Overall Distribution** | $p_1$ | $p_2$ | $p_3$ | $p_4$ | 1 |
| **Base Group Distribution** | | $a_1$ | $a_2$ | $a_3$ | 1 |
| **Treatment 1 Distribution** | $b_1$ | $b_2$ | $b_3$ | | 1 |

* Note: All parameters represent the proportion of the sample that choose the underlying actual size.

The second analysis examines the effect of size labels on people's decisions; where the base group and the treatment 2 group will be compared. If people are fully rational, which means they base their decision only on the actual need of volume, then change in size label should have no influence on their choices. In other words, people who are in treatment 2 group should not choose differently in terms of actual sizes from those who are in base group. To accomplish the analysis, Mann-Whitney U tests will be used, accompanied by a Chi-square test.

If all or one of the H2a, H2b and H3 hypothesis are confirmed, the paper will be supportive of the hypothesis 1: consumers are not rational in choosing soft drink sizes.

# 4. Results

## 4.1. Descriptive statistics

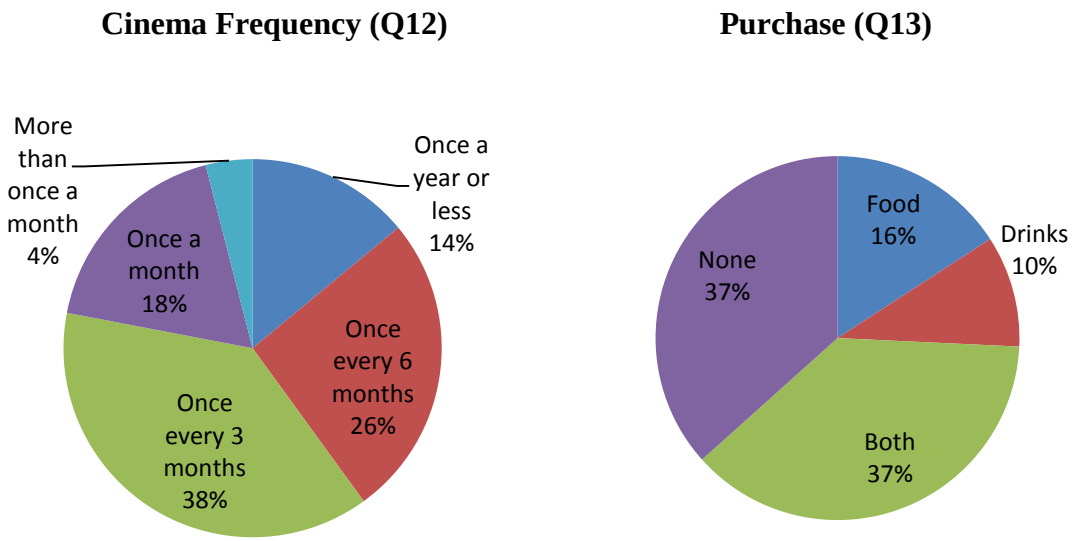
In total 143 out of 156 participants completed the survey. Regarding core questions, namely the questions about soft drink size choices, 145 out of 156 were completed. Thus, descriptive statistics only reports for these 145 participants as they are of our main interest. In summary, 48 respondents are assigned to the base group, 48 to treatment 1 and 49 to treatment 2. In Table 3, the first three variables record participants' choices in each treatment groups as 1, 2 and 3 according to the order in the portfolio from the smallest actual size to the largest. The sample consists of 86 males and 59 females which accounts for 59% and 41% of all participants respectively. Participants age from 18 to 29 with an average of 20.5; most are bachelor students. On average, people answered that they visit cinema every three months and 86% of respondents visit cinema at least once every six months. Around half of the participants reported that they usually buy drinks at cinema and only 37% said they do not buy either food or drinks. Regarding their motive for choosing the drink sizes, most people (39%) answered that they base their decision on the label, followed by choosing according to the amount of drink (33%). Around 18% of the sample reported that there is a maximum price they want to spend on buying drinks.

Lastly, respondents reported on average a rate of 4 (neutral) from range of 1 to 7 on the degree of thirst at the moment of answering the survey. No one reported 7 as being extremely thirsty. To have an overview of all variables, see Table 3 and Figure 1.

Table 3: Descriptive Statistics

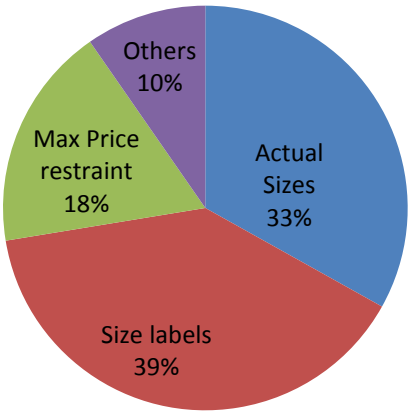
| Variables | Min | Max | Mean | Standard Deviation | Total Responses |
|---|---|---|---|---|---|
| **Base Group** | 1 | 3 | 1.94 | 0.6 | 48 |
| **Treatment 1** | 1 | 3 | 2.23 | 0.66 | 48 |
| **Treatment 2** | 1 | 3 | 1.82 | 0.67 | 49 |
| **Popcorn size** | 1 | 3 | 1.74 | 0.7 | 145 |
| **Gender**[7] | 1 | 2 | 1.41 | 0.49 | 145 |
| **Age** | 18 | 29 | 20.51 | 2.16 | 139 |
| **Thirst** | 1 | 6 | 4.03 | 1.24 | 132 |

Figure1. Descriptive Statistics




[7] Variable gender is coded as 1 if the respondent is a male and 2 if female.

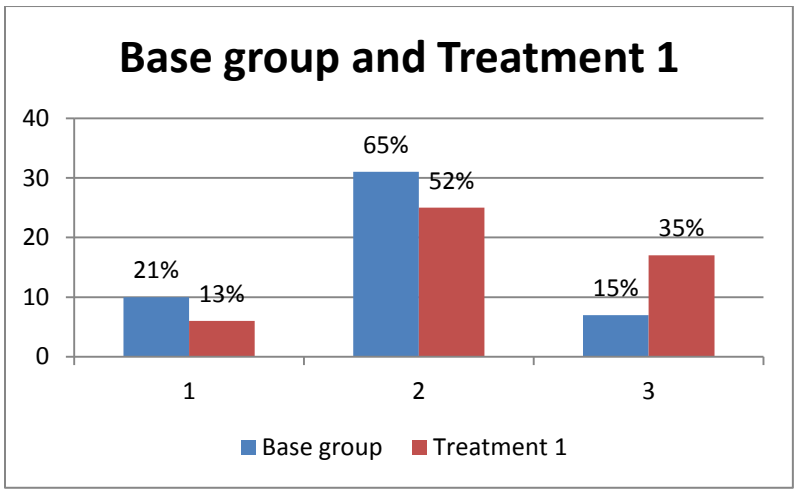
**Decision Motive (Q14)**




## 4.2. Effect of drink sizes

As explained previously, the paper intends to firstly investigate the actual size effect by comparing the base group and treatment 1 group. Recall that, three cups in the two groups have identical size labels, namely *small*, *medium* and *large*, but for each size label, the actual size in treatment 1 is smaller than that in base group. Before applying statistic tests, we firstly take a look at their distributions, shown below as histogram in Graph 2.

Graph 2: Distribution of choices in base group and treatment 1 group




*Note*: Choices are coded as 1,2 and 3 according to their size labels. S*mall* is coded as 1, *medium* is 2 and *large* is 3.

As seen from the graph, the two groups possess overall a similar trend: most people (more than half of the sample) choose the second option and fewer people choose the side options (or the extreme options) which together forms a hill-shaped distribution, supporting the middle option bias supposition. With a closer look, it seems that compared with base group, participants in treatment 1 choose both fewer *small* and *medium* cups but more *large* size. This shows a sign that people are somewhat aware of the actual size changes when considering a purchase. Considering their eventual amount of drink they purchase, in the end 21% of the people in the base group chose the size of 250ml while the proportion is doubled in treatment 1 which is 52%. It is opposed to the rational behavioral argued in session 3.4 that the proportion of people choosing 250ml in the base group should be equal to the summation of the proportions of choosing 200ml and 250ml in the treatment 1 group. Regarding the actual size of 400ml, the proportion drops from 65% in the base group to 35% when participants choose in the treatment 1 portfolio. Thus, this appears to reject the prediction from rational behavioral theory.

As of our core concern, we compare two groups to see if they choose differently among the three size labels. Mann-Whitney U test (or also known in STATA as Wilcoxon rank-sum test) is applied since two groups are independent and measures can be coded as ordinal[8]. Significant difference is found between the two groups, as indicated by Mann-Whitney U test ($p=0.024$). Furthermore, as the rank-sum of treatment 1 is greater than that of the base group, it is designated that participants from treatment 1 choose on average a larger size label than the base group. Thus, the statistics does not support the author's hypothesis that participants are not sensitive at all of actual sizes changes thus choosing identically in terms of size labels. On the contrary, they adjusted by choosing larger size labels. Therefore, hypothesis 2a is rejected.

We thereafter run an ordered probit regression in order to test for the middle option bias as proposed in H2b. In the regression, the three options are set as dependent variables coded from 1 to 3 regarding their size labels and independent variables include *group* (i.e.

[8] Choices are coded as 1, 2 and 3 with respect to size labels *small*, *medium* and *large*.

treatment group), *gender* and *age*. Below presented the equation for the latent variable option*. The result is shown in Table 4 column (1) below.

$$option^* = \beta_1 group + \beta_2 gender + \beta_3 age + \varepsilon \qquad (1)$$

The result shows that treatment groups as well as gender have a significant influence on the propensities of choosing among options. More specifically, participants in the treatment 1 group have a higher propensity to choose larger size labels which is in line with the observation from the histogram in Graph2. With respects to gender, the negative coefficient indicates that on average female chooses smaller size labels.

On the base of the resulting parameters, it is possible to calculate the estimated probability of choosing the second option (i.e. *medium* or option 2) as well as the other two options (the formal calculation is presented in Appendix C). In all situations (i.e. varying the value of variables), the probabilities of choosing the second thus the middle option range between 0.53 and 0.61 which is dominantly greater than the probabilities of choosing the other two options which range between 0.2 and 0.3. The outcome remains the same if taking the degree of thirst into account (See Table 4. Column (2)). Therefore, the estimated probabilities are supportive of the second hypothesis that people have a preference of choosing the middle option over other ones.

**Table 4: Base Group and Treatment 1**

| | Choices | Choices | Size250 | Size250 | Size400 | Size 400 |
|---|---|---|---|---|---|---|
| | (1) | (2) | (3) | (4) | (5) | (6) |
| Group[9] | .530** | .488* | .933*** | .941*** | -.818*** | -.877*** |
| | (.240) | (.254) | (.282) | (.293) | (.270 ) | (.287) |
| Gender | -.494** | -.577** | .569* | .616** | -.586** | -.607** |
| | (.239) | (.252) | (.282) | (.299) | (.271) | (.288) |
| Age | -.014 | -.010 | - | -.035 | - | .028 |
| | (.061) | (.063) | | (.066) | | (.066) |
| Thirst | - | .087 | - | -.108 | - | -.010 |
| | | (.102) | | (.119) | | (.115) |
| Constant | - | - | -1.67*** | -.539 | 1.24*** | .712 |
| | | | (.490) | (1.65) | (.455) | (1.58) |
| Observations | 94 | 87 | 96 | 87 | 96 | 87 |
| Pseudo R2 | .06 | .06 | .12 | .12 | .10 | .11 |

Notes: Oprobit regressions for column (1)&(2); Probit regressions for all other specifications. Robust standard errors in parentheses: */**/*** indicate significance at 10%, 5% and 1% level, respectively. Pseudo R2 level is shown in the last row.

As argued in the section 3.4, if consumers are rational, the proportion of people who choose 250ml in the base group should be larger than that in the treatment 1 group and reversely the proportion of people who choose 400ml in the base group should be less than that in the treatment 1 group. To test it formally, a dummy variable is generated coded as 1 if the drink size is 250ml and 0 otherwise. Probit regression is applied with variables namely group[10], gender, age and degree of thirst as explanatory variables. Results are summarized in table 4 column 3 and 4. As the result shows, participants in treatment 1 choose 250ml with a significantly higher chance than those in base group. In

[9] Dummy variable coded as 0 for base group, 1 for treatment 1 group.
[10] Dummy variable coded as 0 for base group, 1 for treatment 1 group.

other words, significantly more people choose 250ml size drink in treatment 1 than people in the base group which is the opposite of what the rational behavior predicts. Similarly, we perform another analysis for the size drink of 400ml. According to the results (see Table 4 column 5 and 6), the negative sign for the variable *group* designates the opposite influence by the treatment 1 group. Thus, being in treatment 1 decreases the chance of choosing 400ml size drink which is also the reverse of the rational behavior prediction. As a result, the analysis rejects the supposition that consumers are rational in choosing size drinks. Moreover, it is recognized that the results endorse the hypothesis for the middle option bias (i.e. H2b). The option of 250ml is more likely to be chosen when it moves from the first option to the middle. The opposite happens to the 400ml drink, where the 400ml size becomes less favorable when it is changed from the middle option to the third.

Thus, both the estimated probabilities and results from the probit regressions combined show that middle option bias does exist, thus people prefer choosing the middle option in the choice set of three.

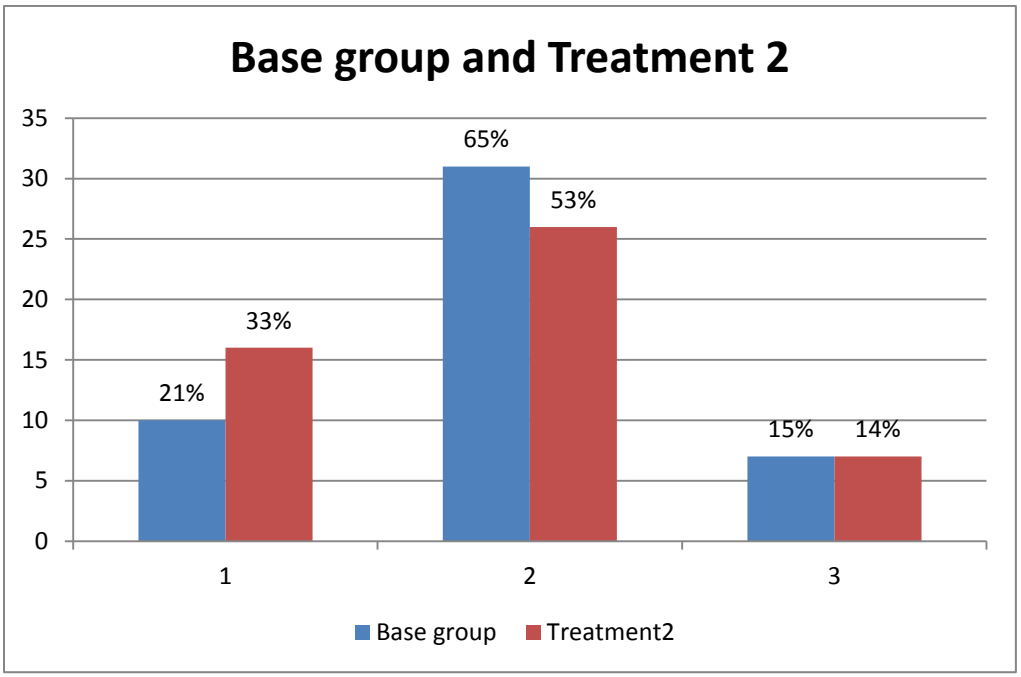
Additionally, to investigate whether participants' decision motive could have influence on the choices they made and conclusion of H2a, interaction terms between two decision motives (i.e. Decide based on size labels and actual sizes) and *group* together with their main effects are included in the regressions. Dummy variables *actualsize*, *sizelabel* and *maxprice* are generated with each one indicating one of the decision motive[11], as well as interaction variables *Actualgroup* and *Labelgroup*[12]. Results are shown in Table 5 (in Appendix D). There is no change in signs of the coefficients for the existing variables. People in treatment 1 have a higher propensity to choose larger size labels than those in the base group (p=0.02). However, for people who claim to choose according to size labels, this effect is offset by the interaction term *Labelgroup*, as the coefficient of the *Labelgroup* is negative and has almost the same absolute value as that of *group*. This means that these people do not choose differently in terms of size labels between the two

[11] Dummy variable *other* , coded 1 when "other" is chosen in the question of decision motive , serves as the control variable to avoid collinearity issue.
[12] *Actualgroup* is the interaction variable between *actualsize* and *group; labelgroup* is between *sizelabel* and *group*.

groups, which in fact coincide with H2a. Among main effects of decision motives, only *actualsize* and *sizelabel* have significant and positive effects (p=0.03; p=0.03). People who choose according to either actual sizes or size labels will both have a higher propensity to choose larger size labels than those choosing *others*. But since this effect is compared with the control variable *other*, the coefficient itself does not have too much indication.

## 4.3. Effect of Size Labels

Graph 3: Distribution of choices in base group and treatment 2 group




*Note*: Choices are coded as 1,2 and 3 according to their actual sizes. 250ml is coded as 1, *400ml* is 2 and *500ml* is 3.

In section 4.3 we examine the effect of size labels on consumer choices by comparing the base group and the treatment 2 group. Recall that the two groups are identical in actual sizes while only the size labels in the treatment 2 group are upsized compared with those in the base group.

As shown in Graph 3, the general distributions are similar where the second option is the most favorable among all samples and the first option ranks the second. When comparing the two groups, roughly the same proportion of the sample chooses the third option (i.e. Choose 500ml size drink). The disparity occurs only between 250ml and 400ml size drink where more people choose the 250ml (the first option) when it is labeled as *medium* (vs. *small*) and fewer people choose 400ml when it has size label of *large* rather than *medium*. It seems that the size label of *medium* possesses special features that attract people's choices. It also indicates that people follow the direction of size label, regardless of their actual sizes.

Having seen the trend of choices moving from the second option to the first one comparing base group from treatment 2 group, we test if the shift is significant by applying Mann-Whitney U test first and then an ordered probit regression. We compare two groups and found no significant difference in distribution. This is indicated by a two-sided Mann-Whitney U test with coding of choices in 1,2 3 as well as with actual sizes (i.e. 250ml, 400ml, 500ml) (p=0.32; p=0.33). Subsequently, an ordered probit regression is estimated with the three drink choices[13] as dependent variables. The formula is similar to equation (1).

Results are shown in Table 6. As the parameter of the variable *group* is not significant under 10% significance level, it is concluded that treatment 2 does not lead to different choosing or purchasing behavior in terms of actual sizes than that in base group. Rather, *gender* has a significant influence (p=0.016) with a negative coefficient at around -0.60, It is also revealed that women have a propensity to choose smaller actual size drinks than their men counterpart. Moreover, degree of thirst has a positive effect on the propensity to choosing larger actual sizes, which seems intuitive.

In column (3) in Table 6, participants' motives for decision are also included where we wonder whether their claimed base have influence on the choices. Same variables were included in the regression as in Table 5. The interaction term between *sizelabel* and *group* show a negative sign (p=0.01). Combined with the fact that the main effect of *group* is not significant, it shows that although in general participants do not choose differently between the two groups in terms of actual sizes, among participants who makes choices based on size labels, people who are in treatment 2 group have a propensity to choose smaller actual sizes compared with those in the base group. This result is in line with our expectations. Since these people choose according to size labels, they do not use actual sizes as the decision motive which is argued to be the rational behavior. When size labels were upsized, their choices will follow the size labels thus resulting in smaller actual size choices. Thus, hypothesis H3 is not supported overall, but is supposed within the subgroup who claims to choose drinks according to size labels which accounts for one third of the total observation.

[13] Coded as 1, 2 and 3 corresponding to size 250ml, 400ml and 500ml.

**Table 6: Base Group and Treatment 2**

| | Dependent Variable: Drink Choices | | |
|---|---|---|---|
| | (1) | (2) | (3) |
| Group | -.321 | -.173 | -.048 |
| | (.243) | (.253) | (.304) |
| Gender | -.605** | -.645** | -.675** |
| | (.251) | (.262) | (.276) |
| Age | -.049 | -.022 | -.040 |
| | (.050) | (.055) | (.062) |
| Thirst | - | .185* | .234** |
| | - | (.102) | (.111) |
| Actualsize | - | - | 1.35** |
| | - | - | (.627) |
| Sizelabel | - | - | 1.36** |
| | - | - | (.619) |
| Maxprice | - | - | .058 |
| | - | - | (.679) |
| Actualgroup | - | - | -1.11 |
| | - | - | (.737) |
| Labelgroup | - | - | -1.96*** |
| | - | - | (.757) |
| Observations | 92 | 85 | 85 |
| Pseudo R2 | .04 | .063 | .13 |

Notes: Ordered Probit regressions for all specifications. Robust standard errors in parentheses: */**/*** indicate significance at 10%, 5% and 1% level, respectively. Pseudo R2 level is shown in the last row..

## 5. Discussion

As we have seen from the results, consumers are not as rational as neoclassical theories assume to be. However, they are also not as easily manipulated as some experiments have shown (Wansink, van Ittersum, & Painter, 2006). When the drink portfolio is downsized in actual sizes, it is observed that people adjusted the smaller actual sizes available by shifting their choices towards larger size labels. Also, under the manipulation of the current experiment, upsizing in size labels do not change their actual sizes choices significantly, which contrast to what Krishna & Aydinoğlu (2010) have found out. It seems that consumers are neither fully rational nor completely mindless, but somewhere in between. Furthermore, combining the results of two treatments, we see that in altering consumers' actual size choices, the effect of the middle option bias plays a much bigger role than the effect of the size labels.

As the experiment was conducted in the form of online questionnaire instead of real life setup, it is reasonable to doubt about external validity of the results generated from the experiment. However, measures have been taken to mitigate the issue such as applying the simulated road trip method in the questionnaire and including prices for the drinks. It is also believed that these measures can effectively trigger consumers' real intention. Some may also argue that by deliberately confronting consumers with the three drink sizes with all detailed information already from the reality. It to some extent forces consumers to think about the choices which they will not otherwise. This deliberation in experimental design and the potential forced choices are not within the ability of this experiment to cope with. It is thus to the interest of the author or maybe other researchers to conduct future studies on this topic in the field.

It is also recognized by the author that the applied price setting in the experiment does currently not exist in the market. Though some research has suggested other pricing methods in combating increasing drink sizes, the value size pricing is still dominant in the soft drink industries which are also argued to be one of the most salient reasons for consumers to choose larger size. Thus, in the real life where the value size pricing is present in general, it is uncertain if the results from the experiment will remain

unchanged. Moreover, as observed from the results, downsizing the actual sizes lead more people to choose smaller actual sizes owing to the middle option bias. It is uncertain if this influence of promoting smaller choices can be offset by the value for money effect.

In the discussion of cup design, size labels are shown at the center of the cups. The other option could be that size labels are shown separately with the drinks (e.g. on the top of the cup). These two alternatives may have different affects. Putting the size label on the cup may lead participants to be more conscious about it. It can also be argued that since it is attached on the cup, they may do not want to purchase the extra-large or large one because the label is shown to everyone around him and it may give a bad image of himself. If the label is separated from the cup, however, this potential affect is not present, as once left from the counter, this size label is not bonded with the cup any more. Thus the author put the size labels on the cups and expected that it can potentially prevent people from choosing too large sizes. However, it is not supported by the results as when the size labels are upsized, the number of people choosing *large* and *extra-large* remain unchanged.

## 6. Conclusion and Implication

In the context of the increasing concern for increasing size of soft drinks leading to more obesity, the paper designed a questionnaire-based experiment that targets at two factors: actual sizes and size labels that may have an influence on choices. The results from the experiment show that consumers are not completely unconscious about the actual sizes that they are consuming while they are still subject to middle option bias. Also, it is observed that size labels do lead to some shift in choosing behavior in terms of actual sizes, though not large enough to be statistically significant. Overall, consumers do not choose drink sizes rationally as they are largely influenced by the portfolio of actual sizes available.

Apart from the conclusion, it is also observed that as people generally prefer the middle option regardless of the actual size portfolio available, when the drink portfolio is downsized in actual sizes, the majority of people choose a smaller actual sizes drink as a

result. As in this study, the majority of people (52%) chose 250ml in the downsized portfolio compared with 21% in the base group and the percentage of people choosing 400ml was halved. This evidence is useful for the policy makers and consumers who are concerned about the urgent issue of oversized soft drinks.

In the year of 2012, New York City Health Department became the first in the U.S. to propose a ban on the sale of sugared beverages larger than 16 oz. in restaurants, theaters etc., (Segal, 2012). Yet the effect of this ban is not conclusive. There are comments that downsizing soft drink is nothing but restricting consumer's choice, without any real impact on intake. The results from this experiment can serve as the support for the New York soft drink ban. When facing with smaller actual sizes portfolios available, people will be nudged to shift their choices to smaller actual sizes even if they claim they will not, as how they responded to the proposed soft drink ban. Thus, it is to the view of this study that the ban is beneficial for the consumers in combating against obesity by directing them to choose smaller drink sizes. However, since the current study was not conduct in the real setting, it is not possible to measure consumers' post-consumption evaluation of their choices. It is conceivable that they choose smaller drinks but realize that the drink size is too small after the consumption which can be not observed in this experiment. Ideally, after they choose and consume the chosen drinks, a question should be posted to them asking if the amount of the drink is too little, just enough or too much for them. If it is then found that consumers make smaller actual size choices in the downsized portfolio while their evaluation toward the amount of drink does not differ from the larger size portfolio, it will be stronger evidence in favor of the New York soft drink ban.

## 7. Bibliography


Argo, J., & White, K. (2012, Mar.). When do consumers eat more? The role of appearance self-esteem and food package cues. *Journal of Marketing, Volume 76*, 67-80.

Ariely, D. (2009, May). *Are we in control of our own decisions?* Retrieved June 17, 2013, from http://www.ted.com/talks/dan_ariely_asks_are_we_in_control_of_our_own_decisions.html

Brian, W., & Kim, J. (2005). Bad Popcorn in Big Buckets: Portion Size Can Influence Intake as Much as Taste. *Journal of Nutrition Education and Behavior*, 242-245.

Bruce, H. B. (2012, March 5). *Experiment: What You See Isn't Always What You Get*. Retrieved June 12, 2013, from answersingenesis.org: http://www.answersingenesis.org/articles/am/v7/n2/experiment-what-you-get

CBS. (2012, July 04). *More People Overweight*. Retrieved June 17, 2013, from http://www.cbs.nl/en-GB/menu/themas/gezondheid-welzijn/publicaties/artikelen/archief/2012/2012-3651-wm.htm

CDC. (2012, Jan.). Prevalence of Obesity in the United States, 2009–2010. *NCHS Data Brief*, No. 82.

CDC. (2012). *The New (AB)Normal*. Retrieved June 19, 2013, from http://makinghealtheasier.org/newabnormal

Chaiken, S. (1980). Heuristic versus Systematic Information Processing and the Use of Source versus Message Cues in Persuasion. *Journal of Personality and Social Psychology66*, 752-66.

Coelho Do Vale, R., Pieters, R., & Zeelenberg, M. (2008). Flying under the Radar: Perverse Package Size Effects on Comsumption Self-Regulation. *Journal of Consumer Research, Vol. 35*.

Consultation, W. (2000). *Obesity: preventing and managing the global epidemic.* World Health Organization technical report series.

Flegal, K. M., Carroll, M. D., Kit, B. K., & Ogden, C. L. (2012). Prevalence of Obesity and Trends in the Distribution of Body Mass Index Among US Adults, 1999-2010. *JAMA*, 307(5):491-497.

Geier, A., Rozin, P., & Doros, G. (2006). Unit Bias A New Heuristic That Helps Explain the Effect of Portion Size on Food Intake. *Psychological Science, 17(6)*, 521-525.

Harnack, L. J., French, S. A., Oakes, J., Story , M. T., Jeffery, R. W., & Rydell, S. A. (2008). Effects of calorie labeling and value size pricing on fast food meal. *International Journal of Behavioral Nutrition and Physical Activity*.

Hill, J., Wyatt, H. R., Reed , G., & Peters , J. (2003, Feb. 7). Obesity and the Environment: Where Do We Go from Here? *Science, 299*, 853-55.

Kahneman, D. (2003). A perspective on judgment and choice: mapping bounded rationality. *American psychologist, 58(9)*, 697.

Kahneman, D. (2011). *Thinking, fast and slow*. Macmillan.

Krishna, A., & Aydinoğlu, N. Z. (2010). Guiltless Gluttony: The Asymmetric Effect of Size Labels on Size Perceptions and Consumption. *Journal of Consumer Research, Vol.37*, 1095-1112.

Kuhn, G., & Land, M. F. (2006, Nov. 21). There is more to magic than meets the eye. *Current Biology, Vol. 16*, R950-R951.

Malik, V., Schulze, M., & Hu, F. (2006). Intake of sugar-sweetened beverages and weight gain:. *The American Journal of Clinical Nutrition, 84*, 274-288.

Marchiori, D., Corneille, O., & Klein, O. (2012). Container size influences snack food intake independently of portion size. *Appetite 58*, 814-817.

Moorman, C. (1996). A Quasi-Experiment to Assess the Consumer and Informational Determinants of Nutrition Information Processing Activities: the Case of the Nutrition Labeling and Education Act. *Journal of Public Policy and Marketing*, 28-44.

Nielsen, S., & Popkin, B. M. (2003). Patterns and Trends in Food Portion Sizes, 1977-98. *Journal of the American Medical Association*, 450-53.

OECD. (2012). *Obesity Update 2012*. OECD. Retrieved June 17, 2013, from http://www.oecd.org/health/49716427.pdf

Paul, R., Astrid, S., & Jordana, L. (2012). Preferring the One in the Middle: Further Evidence for the Centre-stage Effect. *Applied Cognitive Psychology, 26*(2), 215-222.

Raghubir, P., & Krishna, A. (1999). Vital Dimensions in Volume Perception: Can the Eye Fool the Stomach. *Journal of Marketing Research*, 313-326.

Rolls, B., Morris, E., & Roe, L. (2002). Portion size of food affects energy intake in normal-weight and overweight men and women. *Am J Clin Nutr, 76*, 1207-1213.

Sassi, F. (2010). *OBESITY AND THE ECONOMICS OF PREVENTION: FIT NOT FAT*. OECD. Retrieved June 17, 2013, from http://www.oecd.org/els/health-systems/46044572.pdf

Segal, M. (2012, Nov.). *Bloomberg Soda Ban: How a Soda Prohibition Might Cut Rising Health Care Costs*. Retrieved June 19, 2013, from http://www.policymic.com/articles/16637/bloomberg-soda-ban-how-a-soda-prohibition-might-cut-rising-health-care-costs

Sharpe, K. M., Staelin, R., & Huber, J. (2008). Using Extremeness Aversion to Fight Obesity: Policy Implications of Context Dependent Demand. *Journal of Consumer Research, Vol.35*.

Smith, J. M., & Ditschun, T. L. (2009). Controlling satiety: how environmental factors influence food intake. *Trends in Food Science & Technology, Vol 20*(Issue 6-7), 271-277.

Steenhuis, I., & Vermeer, W. (2009). Portion size: review and framework for interventions. *International Journal of Behavioral*.

The InterAct consortium. (2013). Consumption of sweet beverages and type 2 diabetes incidence in European adults: results from EPIC-InterAct. *Diabetologia, 56*, 1520-1530.

Thompson, H., & Vedantam, S. (2012, Sep. 26). *How Food And Clothing Size Labels Affect What We Eat And What We Wear*. Retrieved July 10, 2013, from http://www.npr.org/blogs/thesalt/2012/09/26/161770336/how-food-and-clothing-size-labels-affect-what-we-eat-and-what-we-wear

Ueland, Ø., Cardello, A. V., Merrill, E. P., & Lesher, L. L. (2008). Effect of Portion Size Information on Food Intake. *Journal of the American Dietetic Association*.

Vermeer, W. M., & Alting, E. (2009). Value for money or making the healthy choice: the impact of proportional pricing on consumers' portion size choices. *European Journal of Public Health, Vol.20*, 65-69.

Vermeer, W. M., Steenhuis, I. H., Leeuwis, F. H., Bos, A. E., de Boer, M., & Seidell, J. C. (2011). View the label before you view the movie: A field experiment into the impact of Portion size and Guidline Daily Amounts labelling on soft drinks in cinemas. *BMC Public Health*, 11:438.

Vermeer, W., Steenhuis, I., Leeuwis, F., Bos, A., de Boer, M., & Seidell, J. (2010). Portion Size Labeling and Intended Soft Drink Consumption:. *Journal of Nutrition Education and Behavior*, Vol. 42 Nr.6.

Wansink, B. (2010). *Mindless Eating: Why we eat more than we think.* Bantam.

Wansink, B., & van Ittersum, K. (2007, July). Portion Size Me: Downsizing Our Consumption. *Journal of the American Dietetic Association*, 1103-06.

Wansink, B., van Ittersum, K., & Painter, J. E. (2006). Ice Cream Illusions: Bowls, Spoons, and Self-Served Portion Sizes. *American Journal of Preventive Medicine, Vol. 31 Issue 3,* 240-243.

Zlatevska, N., & Jones, M. ( 2010). Sizing up package size effects. *Advances in consumer research*.

# Appendix A

**Graph 1: Cup Designs**

Base Group:


Treatment 1

Treatment 2

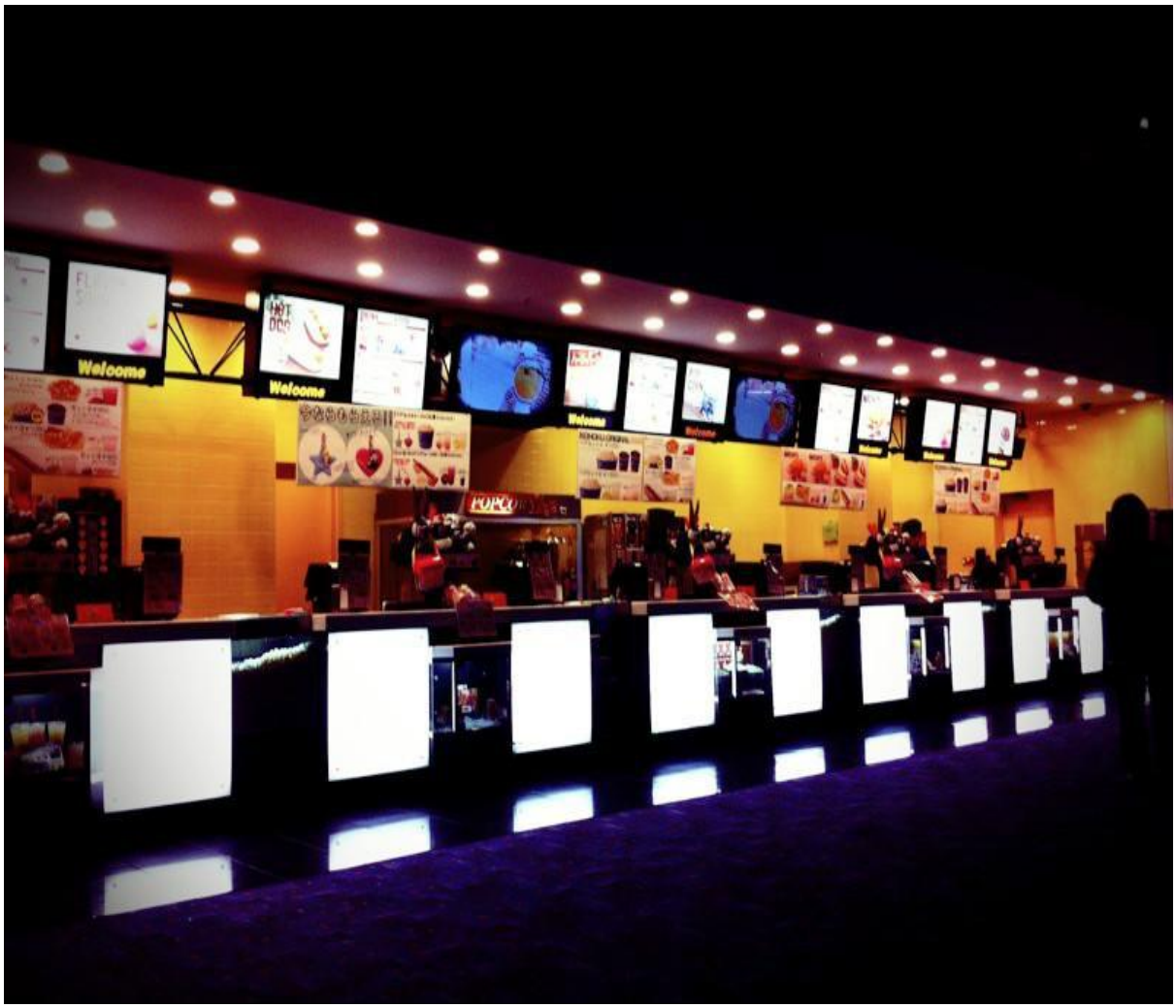
## Appendix B

**Questionnaire**

Q1 Thank you very much for taking 10 minutes to answer this questionnaire! In this survey, we will provide you with a real-life situation, followed by some decisions to make. Please try to imagine the situation and choose as you would in reality. Let us start!

Q2 Today is Friday; you decide to go out with a couple of friends. Since right now there is a movie you really want to watch, you propose to go to the cinema and they all like the idea. You decide to go to a cinema called "Cinema City". (see picture below)

Q3 You walk into the cinema and buy the ticket for the movie you want to watch. Before the movie starts, you still have some time. So you decide to buy something to drink and/or eat. You walk towards the counter.




Q4 At the counter you see the menu. There are soft drinks and popcorn with different flavors. Please make your choice by clicking the button under or next to your choice (from next page on).

Q5. Which soft drink would you like?

- ❍ Cola (1)
- ❍ Cola Light (2)
- ❍ Fanta (3)
- ❍ Sprite (4)
- ❍ Ice Tea (5)

Q6.Which size would you like? (To imagine the true size of the drink, you can compare it to the iPhone 4s, which is shown next to it)

- ❍ Small (1)
- ❍ Medium (2)
- ❍ Large (3)

*Note: In the questionnaire that is presented to Treatment 2 group, the options for Q6 are as follows:

- ❍ Medium (1)
- ❍ Large (2)
- ❍ Extra Large (3)

Q7 What popcorn flavor would you like?

- ❍ Sweet (1)
- ❍ Salty (2)

Q8 Which size would you like? (To imagine the true size of the popcorn, you can compare it to the iPhone 4s, which is shown next to it)

- ❍ Small (1)
- ❍ Medium (2)
- ❍ Large (3)

Q9 The movie is about to start. Enjoy! (Please continue with the survey. There are only a few follow-up questions!)

Q10. What is your gender?

- ❍ Male (1)
- ❍ Female (2)

Q11.What is your age?

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Q12. How often do you go to the cinema?

- ❍ Once a year or less (1)
- ❍ Once every six months (2)
- ❍ Once every three months (3)
- ❍ Once a month (4)
- ❍ More than once a month (5)

Q13 Do you ever buy food and/or drinks in the cinema?

- ❍ Yes, I usually buy food (e.g. popcorn/chips) (1)
- ❍ Yes, I usually buy drinks. (e.g. soft drinks/ beer) (2)
- ❍ Yes, I usually buy both (3)
- ❍ No, I usually do not buy any of them. (4)

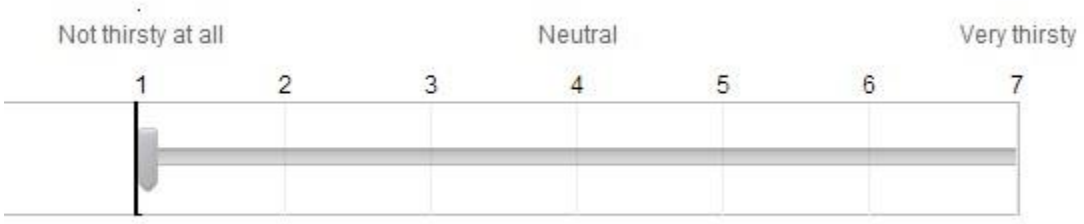
Q14 When you choose from different drink sizes, what is your decision based on?

- ❍ I choose according to the amount of drink (Milliliter / Liter) (1)
- ❍ I choose according to the label (Small / Medium / Large) (2)
- ❍ There is a maximum price I want to spend on it. (3)
- ❍ Others (4) _____

*Note: For treatment 2 group, the following options are presented instead in Q14.

- ❍ I choose according to the amount of drink (Milliliter / Liter) (1)
- ❍ I choose according to the label (Medium / Large / Extra Large) (2)
- ❍ There is a maximum price I want to spend on it. (3)
- ❍ Others (4) _____

Q15 How thirsty are you right now? (Please move the slider to indicate how thirsty you are on a scale from 1 to 7)




Q16. That is all for the questions. Thank you very much for your time!

# Appendix C

**Ordered probit model specification:**

Ordered dependent variables: y=1,2,..m.

Latent variable $y^*$:

$$y^* = \beta_1 x_1 + \beta_2 x_2 + \beta_3 x_3 + \varepsilon$$

The relationship between $y^*$ and y is defined such that:

y=1 if $-\infty \leq y^* \leq \tau_1$

y=j if $\tau_{j-1} \leq y^* \leq \tau_j$, j=2,…m-1

y=m if $\tau_{m-1} \leq y^* \leq -\infty$

where $\tau_1 \leq \tau_2 \leq \cdots \leq \tau_{m-1}$ are thresholds to be estimated using Maximum Likelihood Estimation.

The probability of y=j is thus:

$$p(y = j|x_1, x_2, x_3) = \Phi\left(\tau_j - \beta_1 x_1 - \beta_2 x_2 - \beta_3 x_3\right) - \Phi(\tau_{j-1} - \beta_1 x_1 - \beta_2 x_2 - \beta_3 x_3)$$

where $\Phi(.)$ is the CDF of the standardized normal distribution.

**Table 5: Base Group and Treatment 2**

| | Dependent Variable: Drink Choices |
|---|---|
| | (1) |
| Group | 1.43** |
| | (.632) |
| Gender | -.636** |
| | (.253) |
| Age | -.033 |
| | (.068) |
| Thirst | .078 |
| | (.106) |
| Actualsize | 1.38** |
| | (.589) |
| Sizelabel | 1.44** |
| | (.595) |
| Maxprice | .752 |
| | (.586) |
| Actualgroup | -.958 |
| | (.742) |
| Labelgroup | -1.41** |
| | (.757) |
| Observations | 87 |
| Pseudo R2 . | .11 |

Notes: Ordered Probit regressions for all specifications. Robust standard errors in parentheses: */**/*** indicate significance at 10%, 5% and 1% level, respectively. Pseudo R2 level is shown in the last row..