Framing and signaling effects of taxes on sugary drinks: a Discrete Choice Experiment among households in Great Britain

Running title: Framing and signaling effects of SSB taxes

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Abstract

Taxes on sugar-sweetened beverages (SSBs) are in place in many countries to combat obesity with emerging evidence that these are effective in reducing purchases of SSBs. In this study, we test whether signaling and framing the price increase from an SSB tax explicitly as a health-related, earmarked measure reduces the demand for SSBs more than an equivalent price increase. We measure the demand for non-alcoholic beverages with a discrete choice experiment (DCE) administered online to a randomly selected group of n=603 regular consumers of SSBs in the UK whose households also include children. We find suggestive evidence that a price increase leads to a larger reduction in the probability of choosing SSBs when it is signaled as a tax and framed as a health-related and earmarked policy. Respondents who did not support a tax on SSBs, while more likely to choose SSBs in the first place, were on average more responsive to a price increase framed as an earmarked tax than those who supported the tax. The predictive validity of the DCE to capture preferences for beverages was confirmed using actual purchase data. The findings imply that a well-signaled and earmarked tax on SSBs could improve its effectiveness at reducing the demand.

Keywords: demand analysis, discrete choice experiment, sugar-sweetened beverage tax, framing and signaling, United Kingdom

Introduction

Excessive consumption of added sugars has been associated with growing prevalence of ill-health, including obesity, cardio-vascular diseases, diabetes and dental caries globally (WHO, 2018). Taxes on sugar-sweetened beverages (SSBs) have become a popular measure to reduce sugar consumption with over 30 countries or local jurisdictions having announced or already implemented such a policy in recent years (WCRF, 2018). Existing evidence from countries that have implemented such taxes indicates that they result in a small reduction in the purchases of the taxed products, the magnitude of which seems to depend on the tax rates and the local context. A recent estimate from a meta-analysis suggests that the demand for SSBs decreases by 10% in response to a 10% tax (Caro et al., 2018; Colchero, Popkin, Rivera, & Ng, 2016; Nakamura et al., 2018; Redondo, Hernandes-Aguado, & Lumbreras, 2018; Silver et al., 2017; Teng et al., 2019). To date, little attention has been paid to the impact of the way in which taxes are framed and communicated to the public. By this we mean not only whether the tax is signaled to the consumer, but also if the reasons for introducing it are explained. This is important as both aspects could affect consumer behaviour and demand towards different beverages.

Some experimental studies have looked at this issue in the broader context of food choice, producing mixed evidence. For example, subsidies on healthier foods have been found to be effective in combination with framing or signaling interventions (e.g. advertising or promoting price change, providing nutrition education or improved labelling) (Afshin et al., 2017). There was no equivalent evidence for taxes, because few studies have tested their effect in combination with framing or information (Afshin et al., 2017). Meanwhile, the behavioural economics literature also provides mixed evidence on the effectiveness of 'priming' and 'salience' nudges to encourage consumers to healthier choices (Papoutsi, Nayga, Lazaridis, & Drichoutis, 2015; Seah et al., 2018; Wilson, Buckley, Buckley, & Bogomolova, 2016).

In practice, the framing of existing taxes on SSBs in various countries seems to have varied over time. In the earlier examples of Hungary (tax on unhealthy food and SSBs from 2011), Finland (tax on sweets and SSBs between 2011-2017) and France (tax on all added sugar or artificially sweetened beverages from 2012) the framing – followed partly from the aim or the purpose of the tax – had a strong emphasis on general revenue collection (Cornelsen & Carreido, 2015). In recent years, SSB taxes have been more explicitly framed as a public health measure to reduce sugar consumption, prevalence of obesity and associated negative health outcomes, especially for children (e.g. Mexico, local taxes in the US, South Africa, UK).

Another possible frame comes from combining the two aspects in which tax revenues are specifically earmarked to finance interventions or treatment of obesity and related diseases (e.g. UK levy on sugary drinks producers, some local taxes in the US). A recent meta-analysis estimated that public support for SSB tax increases from 42% to 66% if revenues are used for health initiatives (Eykelenboom et al., 2019). In fact, Cremer et al. (2016) demonstrate, in a theoretical framework, that earmarking a fraction of tax proceeds to reduce health insurance premiums and retaining revenues to subsidise healthier goods can be welfare maximizing (Cremer, Goulao, & Roeder, 2016). Another recent study provided suggestive evidence of the potential effect of framing and information on earmaking tax revenue for health from Berkeley, California where a penny-per-ounce tax on SSBs was introduced in 2015, with its revenues to be used for nutritional or other public health programs. The authors of the study observed a significant reduction in purchases of SSBs already after the local political campaign and vote for the tax few months earlier, suggesting that purchasing behaviours started to change before the tax was implemented.

Signaling of the tax to the consumer can take place in many ways, including through messaging on packages (e.g. as for cigarettes), or general information concerning the policy being provided on the shelf or directly on price labels (e.g. sales taxes in the US). Clear signaling of the tax-inclusive price at the point of choice has been shown in different contexts (e.g. road tolls, non-food retail, and alcohol) to make it more salient, meaning the response to it is stronger in comparison to when the tax is signaled at the point of payment (Chen, Kaiser, & Rickard, 2015; Chetty, Looney, & Kroft, 2009; Homonoff, 2018). In the UK consumers face tax-inclusive prices in shops, where the price on the shelf (or package) does not show either the tax-exclusive price or the tax rate. However, when the levy on sugary drinks producers was introduced in the UK in April 2018, many major retailers chose to use voluntary signage on beverage shelfs explaining that SSBs were priced higher due to the levy. Therefore, signaling need not take place only via price or price tags to inform or remind consumers of the policy.

The likely direction of the signaling and framing effects is difficult to determine *a priori* because, for example, improving knowledge of the negative health effects of high-sugar consumption could reinforce the price effect, while attitudes that oppose government intervention in consumer choice could undermine this (i.e. buying despite the higher price as a ‘protest’ against taxation). Equally, knowing that revenues are earmarked for a good cause, such as improving children’s health or education, might, for some consumers, create a reverse incentive to support the cause and even increase purchase of the taxed product. Impact

evaluations of existing taxes identify both price- and context-specific framing and signaling effects, and are rarely able to disentangle these two separate effects. This is because appropriate control groups are in practice difficult, if not impossible, to find.

This study targets this gap in the literature and aims to compare the effect of a framed and signaled tax to an un-signaled and un-framed equivalent price increase on the demand for SSBs and other non-alcoholic beverages. To measure responses in the demand to price changes, we use a discrete choice experiment (DCE). DCEs are common in marketing research, including in the analyses of demand for foods and beverages, and consumer willingness-to-pay for product attributes (e.g. organic certification, health-related claims or environmental sustainability of foods) (Colson & Grebitus, 2016; Jenssen & Hamm, 2012; Krystallis & Chrysochou, 2012; Tait, Saunders, Guenther, & Rutherford, 2016). It is well suited for the UK context as at the time of the study, in September 2017, a levy on sugary drinks producers had been announced but had not yet taken effect. In our study, we implemented a survey experiment to contrast two alternative frames: one informs the respondent of the health-related reasons for introducing a SSB tax, and the second included further information on how the revenues from the tax would be used. By conducting the DCE among a sample drawn from a panel of consumers who regularly report their food and beverage purchases (operated by Kantar), we were able to take into account participants usual beverage purchasing behaviour and assess the validity of the DCE in making beverage choices.

Methods

Survey experiment

In an online survey (see appendix for questionnaire), study respondents were presented with a series of choice tasks asking them to consider a typical shopping occasion at a supermarket for their household, and indicate the drink they would most prefer for their family from a set of alternative beverages (described in detail below). To test the effect of the tax signaling and framing on their choice, we randomised respondents to one of three groups, which differed in the way the price of SSBs were presented: control (no frame), 'health' frame, or 'health and earmark' frame. The surveys presented to respondents in each group were identical with two exceptions. First, respondents in the 'health' and 'health and earmark' frame groups were informed before seeing any of the beverage choice sets that the price of SSBs included a tax, introduced for health reasons (see table 1). In the 'health and earmark' frame group, the

message further indicated that the revenues from the tax would be used to support school sport and nutrition education. Secondly, for the two frame groups, the tax - at a 20% or 40% rate - was also signaled on the choice set (figure 1).

[Table 1 here]

DCE design

We used a labelled DCE design, where each choice set included four alternative groups of beverages: sugary drinks (SSB), diet/low-sugar drinks, pure (100%) juice, water and an opt-out option (labelled as 'no choice'). The labelled design allowed more flexibility than a generic design to define the specific characteristics of each type of beverage. The selection of alternatives was informed by the typical structure of taxes on sugary drinks whereby diet/low-sugar beverages and juices with no added sugar are not taxed but represent different substitutes based on sugar content (see table 2).

The price range of each alternative was chosen by analysing the lowest and highest prices charged in online supermarkets (March 2017) for the range of products under each type. Because prices varied depending on the type of the beverage as well as whether they were branded or non-branded (e.g. store own label), price was introduced as a nested attribute and its levels were chosen dependent on the values of the branding and type attributes. To keep the decision setting more real-world like, the squash/cordial category prices were kept at product level rather than converted to ready-to-drink price using a dilution ratio. A tax rate of either 20% or 40% was included for the SSBs only. The former level is typically found as sufficient to effect significant changes in demand (Briggs, A. D. M. et al., 2016), and commonly used in studies simulating the effects of SSB or nutrient based taxes (Briggs, A. et al., 2013; Harding & Lovenheim, 2017), and the latter was added to test whether a higher tax rate would lead to non-linear effects. We did not use the rates for the UK levy on soft drinks producers because, at the time the study was designed, these rates were not yet officially confirmed.

[Table 2 here]

The ease and clarity of choice sets (see example in figure 1) were tested in an online pilot study (n=69) recruited with the same characteristics as the full study (see Study Sample). Overall, 93% of the pilot sample felt the questions were relevant to them and 89% felt they could give

all or most answers they wanted to give which we considered as sufficient to proceed with the design.

To generate the final DCE questionnaires, we used a D-efficient design using priors estimated from the pilot study (the pilot study used the same design but zero-priors). The designs for the pilot and the main survey were created using NGENE software (ChoiceMetrics, 2012). The nested price attribute was coded in the design through imposed conditions depending on the type of the drink and its branding.

Following principles of experimental design theory the final survey included 24 choice sets, a number divisible by the number of attribute levels (2, 3, 6 or 8), to obtain a balanced design where each attribute level appears an equal number of times (Reed Johnson et al., 2013). As this was considered too large for any one respondent to complete, we blocked the design into two blocks of 12 choice sets each. Block, order of choice sets in the questionnaire, and the order of alternatives within in each set was randomised.

[Figure 1 here]

Additional information

In addition to the DCE, the questionnaire included a further two series of questions. First, before starting the DCE, respondents were asked whether they had diabetes, were on a diet, or were pregnant or breastfeeding. Answers to these questions were used to control for potential external health-related factors affecting beverage choices. Second, respondents were also asked, after they had completed the DCE, whether they knew about the UK Government plans to introduce the levy from April 2018 (answer options: yes/no/have heard of it but not sure what it means), and whether, in general, they supported plans to introduce this levy (answer options: yes/no/unsure). These questions were introduced to understand overall knowledge about the policy among the respondents and whether there could be differences in the response to the DCE based on the self-reported support towards the policy.

Study sample

The sample was drawn from a nationally representative Fast Moving Consumer Goods (FMCG) panel (with respect to geographical region, age of the main shopper, household size and socio-economic status) of households in Great Britain. Annual panel size is approximately 32,000 households. Access to the panel was provided by Kantar, one of the world's leading data, insight and consultancy companies that has been operating the FMCG panel since 1991.

The panelists provide records on their day-to-day purchases of consumer goods, including foods and beverages for consumption at home (we refer to these data later as home-scan). Kantar regularly conducts market research surveys among this panel for their own research and when commissioned by clients.

The sample for the DCE was restricted to households who had purchased at least 2 litres of SSBs every month over the past six months (based on home-scan purchases), and who had at least one child under the age of 18. These criteria were set, first because nationally the policy direction in the UK is focused on preventing childhood obesity and therefore we considered households with children as a key population subgroup. Secondly, we wanted to capture in the sample households that were regular purchasers, regardless of being heavy consumers or not (again as key target to the policy) and the criteria of having purchased at least 2 litres of SSBs monthly allowed us to exclude households who never purchase SSBs or do so irregularly. Participants meeting these criteria based on the home-scan data were randomly selected for invitation into the DCE. While not necessarily representative of the whole population, this informs preferences of the population targeted by these policies. Assuming a response rate of ~70% the survey was made available for 780 households through a weblink. We assumed that it was the main respondent (shopper) to the FMCG panel who also completed the survey.

The survey was conducted during a 10-day period in September 2017 by Kantar who collected the survey results and further provided socio-demographic data (household size, number of children, income bracket, region, highest qualification, tenure, and socio-economic status) as well as home-scan purchase records of non-alcoholic beverages in 2017 (for consumption at home). Based on the home-scan purchase records we created a variable representing the average weekly volume in litres of beverages purchased per household member in each of the four alternative beverage categories, which we used in the modelling stage to control for household usual behaviour in choosing the beverages.

Analytical plan

We first compared the unadjusted choices of each alternative across the three groups. We then used the multinomial logit (MNL) model to build the adjusted model structure, and confirmed using the MNL model that blocking did not have significant effects on choices via a dummy variable indicating the different block. We then proceeded to estimate the model using the mixed (random effects) logit (MXL) model, which allows consideration of respondent heterogeneity in preferences towards different beverages.

We assumed that individual *i (i=1,…,603)* makes choices such that they maximise utility over the four alternatives presented *(j=1,2,3,4).* The utility U_{ijc} derived from choosing a particular alternative *c* can be decomposed into the linear combination of attributes of this alternative and an error term (McFadden, 1973):

$$U_{ijc} = X_{ijc}\beta + \varepsilon_{ijc}$$

Where vector X_{ijc} consists of observable product attributes and respondent characteristics:

$$X_{ijc} = \beta_0 ASC_j + \beta_1 Type_j + \beta_2 Brand_j + \beta_3 Price_j + \beta_4 Tax40_j + \beta_5 Vol_{ij} + \beta_6 H_{ij} * ASC_j + \beta_7 HE_{ij} * ASC_j + \sum \gamma_i Z_i \quad (1)$$

where β_0 are coefficients for alternative specific constants (ASCs) for each alternative *j*. Coefficient(s) for β_1 and showed respondent sensitivity to attributes regarding type. For SSBs and diet drinks three 'type' categories were included (fizzy, juice drink and squash) and two 'type' categories was included for juice (juice, smoothie) and water (still and sparkling). Coefficient for β_2 showed preference for branding (branded/non-branded). β_3 showed respondent price sensitivity of alternative beverages *j* and β_4 showed sensitivity to the tax rate shown with the price of SSBs in 'health' and 'health and earmark' frame group only (20% or 40%). β_5 measured the extent to which respondent average weekly purchases of each of the alternative beverages *j* influenced the choice. Coefficients β_6 and β_7 indicated effects from the respondent *i* belonging into either 'health' (H) or 'health and earmark' (HE) frame group, respectively via interaction with ASCs. These variables were, in the estimated model, also further interacted with the remaining attributes and respondent characteristics to allow for differences between the three groups.

Z_i are the set of variables describing the respondent (or their household). These included the number of children and if they had not indicated any of the conditions asked pre-DCE (on diet, diabetes, pregnant or breastfeeding). These two variables were included because of the slight differences between the groups in these characteristics. Finally, we further included income as this tends to be associated with SSB consumption in the literature (Smith, Cornelsen, Quirmbach, Jebb, & Marteau, 2018). In the initial model building we also tested inclusion of variables indicating whether respondents knew about the UK levy, household occupational socio-economic status, age and sex of the main respondent. These did not improve the model fit based on the log-likelihood.

While support towards the levy could affect the reaction to price increase or a tax, we did not include it as an explanatory variable in the model because the question was asked after the DCE and its answer could be influenced by the choice experiment. Rather, we repeated the estimation in subsamples according to the response to the question on support (yes, no, unsure) to understand if there are differences in the response to the price increase and framing based on self-reported support.

All the categorical variables used in the model were effects coded. These entered the model with still one category omitted but its coefficients were interpreted independently, rather than as compared to the excluded category. Given the heterogeneous preferences towards the beverages across individuals, the MXL estimation treated price, volume and ASCs as random parameters with normally distributed coefficients, and the remaining variables were treated as fixed. Normal distribution for price means that we allow also positive response to price increase, which could be a possible outcome if consumers continue to choose beverages despite the tax. Models were estimated using Stata 16 choice modelling commands (StataCorp., 2019).

Finally, we explored how the choice of SSBs varied at different levels of price and predicted marginal effects on the choice of SSBs and other beverages from a 20% and 40% price increase (control group) or tax ('health' and 'health and earmark' frame groups).

Assessment of validity of stated preferences in comparison to revealed preference data

Access to home-scan data on respondent beverage and total food expenditure allowed us to test the (predictive) validity of stated choices. This is important because while DCE's can provide a useful framework for eliciting preferences where choices are limited (e.g. health care treatment options), it may not adequately capture choice in the context of many possible alternatives, such as beverages on a supermarket shelf. Our analysis, comparing the stated and actual choices, aims to provide evidence concerning the validity of stated choices. This analysis was conducted only in the control group, which is the best comparator for the real-world choices observed in home-scan purchases, as respondents were not influenced by the tax imposed in the other two groups.

We started by creating a dataset from home-scan purchase data in the same structure as the DCE data, by categorising the product level purchases of beverages in the home-scan dataset into the four alternative categories used (SSBs, diet beverages, 100% fruit juice, and bottled water). We used the full year (2017) of home-scan data to avoid picking a subset of the data with seasonal effects. A choice 'set' was then created as any occasion where households had

shopped for any foods or beverages (i.e. they were in a shop and had the opportunity to purchase a beverage). A binary choice variable was created for each of the four beverage categories if at least one product belonging to these groups had been purchased during the occasion (i.e. positive total food and beverage expenditure). 'No purchase' was identified as those occasions where no beverages in any of the alternative groups were purchased.

We then created a price variable using average purchase prices in each alternative category. Where price was not observed (i.e. purchase was not made in a particular shopping occasion for a specific alternative) we used an average weekly price in the postcode area where the respondent resided. Price was capped at £4L to keep the price range comparable with DCE, which excluded less than 1% of observations. We used an MNL model, including ASCs and price in the model for actual purchase data, to compare the direction of the coefficients and predicted market shares (choice probabilities) to those estimated from the DCE data (the MNL model for DCE data included design attributes but not usual purchase volumes or socio-demographic characteristics). ASCs were also effects coded to match the DCE data setup. We estimated MNL on the: a) full sample of actual purchases, which included 24% of shopping occasions where more than one beverage was bought; and b) shopping occasions where only one beverage was purchased. Where more than one product was purchased in one occasion, the likelihood was estimated using a recursive computation algorithm (StataCorp., 2017).

Results

Table 3 describes the main characteristics of respondents, and tests for differences across the three groups. There was a small difference in the overall household size, which appeared to be driven by small differences in the number of children. Responses to health-related questions indicated differences in the share of people who were on a diet, which was highest in the 'health and earmark' group. For the remaining socio-demographic characteristics (income, occupational socio-economic status, region, highest qualification, tenure), there were no statistically significant differences across the three groups (see table A1 in appendix).

Average weekly consumption per household member varied between 0.62 and 0.70 L for SSBs, 0.85 to 0.98 L of low-sugar/diet drinks, and 0.08-0.11 L of juice with no added sugars and 0.26 to 0.33 L of bottled water. Differences across the groups were not significant. While knowledge of the UK levy (asked after the DCE) did not vary significantly across the three groups

(p=0.350), support towards the policy did (p<0.001) and was highest in the 'health and earmark' frame group (45.5%) and lowest in the control group (28.2%). To the contrary, the control group had the highest share of respondents who did not support the levy (48.8%).

[Table 3 here]

Looking at unadjusted choices (figure 2), framing the price increase as a tax appears to reduce the choice of SSBs in 'health' and 'health and earmark' group, in comparison to the control, while increasing the choice of diet, water or not choosing a beverage. Chi-square test confirmed that choices were significantly different across the three groups for SSBs (p=0.04), diet beverages (p=0.048) and water (p=0.001).

[Figure 2 here]

DCE results

The MNL and MXL models appeared relatively robust, with only small differences in both the magnitude and significance of the coefficients. We interpreted MXL (table 4) as the main outcome model as it had a better fit than the MNL (smaller log-likelihood and AIC). The MNL results are shown in appendix table A2.

[Table 4 here]

In the MXL model, looking at the ASCs (table 4, where each column shows the output for each alternative), respondents were more likely to choose SSBs or diet beverages and less likely to choose pure juice or bottled water in comparison to choosing nothing (p<0.01). This was not surprising, as the sample was selected as those who regularly purchase SSBs. In comparison to the control group, the 'health' frame group appeared to be more likely to choose water (p<0.001) but less likely to choose juice (p=0.037).

In relation to the type of beverage, for SSBs respondents were less likely to choose a juice drink (p<0.001) but more likely to choose a branded SSB (p=0.002). Neither attribute had significant differences for the tax frame groups. Price coefficient was, as expected, negative (p<0.001) indicating that respondents were less likely to choose SSBs if price was higher. Price coefficients for both 'health' and 'health and earmark' groups were more negative indicating that the respondents were likely to be more price sensitive, though this was significant (p<0.1) only for the 'health and earmark' group. Greater usual purchase volumes of SSBs were

associated with higher likelihood of choosing SSBs (p=0.009), but again the difference between groups was not significant. Household characteristics, while in expected directions, did not have any associations with the likelihood of choosing SSBs at conventional statistical significance levels.

For diet beverages, respondents had a lower likelihood of choosing fizzy and juice drinks (p<0.001). Branding did not appear as a significant attribute in diet beverage choice. As for SSBs, an increase in the price was associated with lower likelihood of choosing the diet beverage alternative, and a higher usual purchase volume was associated with a higher likelihood of choosing this alternative (both p<0.001). Higher income was associated with a lower likelihood of choosing a diet beverage (p=0.042) and, conversely, a larger number of children in the household was associated with a higher likelihood of choosing a diet beverage (p=0.033).

The likelihood of choosing pure juice was greater if the type of beverage was juice instead of a smoothie (p<0.001) and this was even greater for the "health and earmark" group (p=0.046). Respondents were less likely to choose a branded juice alternative (p<0.001) and, as before, less likely to choose it when prices increased (p=0.01). Usual purchase volumes or household characteristics were not associated with the likelihood of choosing juice and there were no differences between the three groups.

Finally, there was a higher likelihood of choosing still water (p<0.001). An increase in price and usual purchase volumes were again associated with lower and greater likelihood of choosing water, respectively (p<0.001). The association with usual purchase volumes was smaller for both tax frame groups (p<0.08). Those with higher income in the control group were more likely to choose water (p=0.006), but this was not the case for the tax frame groups (p<0.05). More children in the household was associated with a lower likelihood of choosing water in the 'health' frame group only in comparison to control group (p=0.001).

As noted before, ASCs, price and usual purchase volumes were entered in the model with random coefficients and these all had, with the exception of volumes for SSB and juice alternative, significant variation indicating heterogeneity in consumer preferences with respect to these variables.

To interpret the model estimates we first explores SSB choice at different price levels across the three groups. We derive the demand curve from the predicted probability of choosing SSBs

at different price values ranging from £0.5/L to £4/L. Figure 3 shows that tax frame groups were consistently less likely to choose SSBs in comparison to the control group.

[Figure 3 here]

All three groups show a downward sloping demand curve; they were increasingly less likely to choose SSBs as prices increased. At sample average price levels (£1.06/L) the probability of choosing SSBs was similar in 'health' (26.2% 95%CI 23.3;29.0) and 'health and earmark' (27.2% 95%CI 24.2;30.2) frame group (26-27%) and lower compared to control group (30.7% 95%CI 27.8;33.6). At low prices (£0.5/L), the difference with the control group reduces for the 'health and earmark' frame group. However, across the groups the slope of the curve becomes steeper as price grows suggesting that demand is less sensitive to price changes at high prices (>£2L). While the demand for SSBs among the two tax frame groups at every price level is lower in comparison to the control group, these differences were not statistically significant at conventional levels with 95% confidence intervals overlapping across the three groups.

Next, we simulated the change in the probability of choosing alternatives after a 20% and 40% price increase (or tax in tax frame groups) using MXL model estimates. Figure 4 shows that a 20% price increase would lead to a significant decrease in the choice probability of SSBs in all three groups. The probability of choosing SSBs is predicted to fall by 1.3 percentage points (pp) in the control group (95% CI -2.0;-0.5), by 1.2 pp in the 'health' frame group (95%CI -1.9;-0.6) and 1.9pp (95% CI -2.6;-1.2) in the 'health and earmark' frame group. To obtain the corresponding price elasticity we calculated the relative percentage changes (-4.1% in control group, -4.7% in 'health' frame and -6.9% in 'health and earmark' group), yielding estimates of the price elasticity of the demand for SSBs of -0.21, -0.24 and -0.35 respectively. [Figure 4 here]

Figure 5 suggests that the effect of a tax increase on the demand may not be linear, as the effect of a 40% tax is slightly less than twice the effect of a 20% tax with a reduction in the probability of choosing SSBs by -2.3 pp (95%CI -3.7;-0.1) in the control group and 'health' frame group (95%CI -3.5;-0.1), and -and 3.5pp (95%CI -4.8;-2.2) in the 'health and earmark' frame group. Across the groups, the most common substitute was diet beverage, followed by no choice.

[Figure 5 here]

Finally, we looked at differences in beverage preferences, according to respondents' support of the levy. As before, using the MXL estimates (table A3 in appendix) we found the predicted

probability of choosing SSBs and simulated the impact of a 20% price change of SSBs (tax)[1]. Looking at figure 6 it is clear that those who did not support the policy had the highest proportion of SSBs in their choices (30-37% across the three groups) in comparison to those who did (22-24%) or were unsure (25-30%).

[Figure 6 here]

Among respondents who supported the levy (see figure 7), there was a significant reduction in the demand for SSBs following the price increase only in the presence of the 'health' and 'health and earmark' frames (demand was reduced by -1.7pp (95%CI -2.8;-0.5) and -1.6pp (95%CI -2.6;-0.6) respectively), but not when the price change was not signaled or framed (-1.2 pp (95%CI -2.4;0.2). Those who were unsure were showed a similar pattern. Among those who did not support the levy, the demand for SSBs decreased most in the presence of 'health and earmark' frame (-2.6 pp (95%CI -4.0;-1.2)) or without any frame (reduction by -1.6pp (95%CI -2.7;-0.5) in the control group). The effect of the 20% price increase on the demand with the 'health' frame (-0.7pp 95%CI -1.9;0.6) was not significant.

[Figure 7 here]

Comparison of revealed and stated choices

Comparing actual purchases obtained through home-scan data and predicted purchases based on stated preferences data from the DCE, we found some notable differences (table 5). Predicted demand based on the DCE suggest that fewer people would choose none of the beverages offered, compared to what they actually do (19% vs. 35.2% in home scan data). Since respondents do not have to make a real purchase in the DCE, it is not surprising that they would choose "no-choice" less often. Because the drink categories are broad, they could also imagine that their preferred drink within a category is available, while this might not be the case when they actually shop. Meanwhile, the DCE appears to predict relatively well drink preferences, and the market shares for the SSBs (26.3% in home-scan data vs 31.1% in the DCE) and diet beverages (29.9% in home-scan data vs 28.2% in the DCE).

The price coefficient in home-scan data indicated slightly greater price responsiveness in comparison to the DCE, which again is intuitive as DCE did not involve an actual purchase but

[1] In order for the MXL to converge in the subsamples we had to simplify the model by removing demographic variables (income, presence of children and health conditions) and moved 'volume' in to the fixed part of the model.

the difference in the magnitudes is relatively small. Price elasticity of demand from home-scan data was -0.33 (-0.32 if only one alternative was chosen per occasion) in comparison to -0.21 from the DCE. This does suggest that the results of the DCE above are, if anything, underestimating the impact from a price increase.

[Table 5 here]

Discussion

Framing and signaling are potential ways of influencing (or nudging) consumer choices beyond the effects of the price change itself. We measured these relatively little studied effects for a tax on SSBs, which has become a popular policy measure aimed at reducing sugar consumption. Our findings were mixed. When the tax for SSBs was not framed or signaled (control group), we found suggestive evidence that the predicted demand for SSB was higher (30.7% choice probability) compared to situations where a tax was introduced and signaled ('health' and 'health and earmark' frames, 26.2% and 27.2% respectively). However, these estimates had overlapping confidence intervals. A 20% price increase was estimated to reduce the probability of choosing SSBs both in the control and 'health' frame group by 1.2 pp, compared to a 1.9 pp reduction in the health and earmark frame. While the effects of price changes itself were significantly different from zero for all three groups, the comparisons between the groups again were not. This means that we cannot confidently associate the relatively larger drop in health and earmark group with the signaling and framing.

However, our result of a larger effect from a health and earmarked tax frame would be consistent with other studies suggesting that earmarking SSB taxes could make the tax more effective at reducing the demand for SSBs. Yet, the social welfare implications depend on whether the reduction in SSBs consumption translates into actual healthcare cost savings, and how those as well as tax revenue are allocated (Cremer et al., 2016). We also found that the greatest response to a 20% price increase among those who did not support a tax was, when the health objective and earmarking of the tax was underlined, indicating that efforts to explain the tax purpose and investing proceeds into relevant cause may increase its objectives amongst the most skeptical. Nonetheless, these sub-group effects should be interpreted cautiously as the interaction terms in the model between price and group were not significant, although this could be due to small effect and sample sizes.

Access to revealed (home-scan) purchase data meant that we were able to test the validity of the stated preferences in this context. From this analysis, we found that the DCE was able to

predict preferences for the different beverage categories reasonably well, both in terms of relative ranking to one another, and the absolute demand levels for the two preferred options (SSBs and diet drinks). The unique noticeable difference was that the DCE under-estimated the proportion of those who would choose none of the beverages offered. This could potentially be corrected in future studies by either calibrating the DCE data or making DCE choice more realistic by adding a real-purchase to the study design. In this case we did not choose to calibrate the DCE data as we were explicitly testing how the preferences would change due to a policy, and calibrating to preferences from a context of 'no policy' would have undermined this objective.

Our study provides valuable insights into how those households who are the key target of the SSB tax – i.e. those who consume SSBs regularly and have children – are likely respond to a tax framed in different ways. Because a subsample like this is rarely studied, there is limited literature to compare our findings to. The closest experimental study to ours, analysing the response to fiscal policies in parental choices between healthier and less healthy foods for children in Greece, concluded as well that providing information about the policy further increased the impact of the policy intervention (Papoutsi et al., 2015). In an evaluation of the effects of the SSB tax in Philadelphia, Cawley et al. looked at the changes in purchases and consumption of beverages of households who have children (Cawley, Frisvold, Hill, & Jones, 2019). They found that purchases of taxed beverages from stores in Philadelphia dropped, but increased outside of the city. Frequency of adult soda consumption reduced by 31% overall, but among children consumption of added sugars reduced (by 22%) only among the subgroup of high-consumers (those who consumed more than 20-ounce per day).

We estimate that the demand price elasticity ranges from -0.21 to -0.35. These estimates are smaller than those obtained from large scale observational studies, where price elasticity of the demand for SSBs ranges from -0.8 to -1.2 (Andreyeva, Long, & Brownell, 2010). Two reasons can explain this discrepancy. First, our sample was restricted to regular consumers, who have been shown to be less price sensitive (Dubois, Griffith, & O'Connell, 2017). By contrast estimates from observational studies come from both regular and irregular customers. Second, the discrepancy could come from differences in the choice sets faced by customers in the DCE compared to the real-world setting (larger number of options to choose from in the latter would yield to larger responses to price changes) as well as considerations of budget constraint.

The study presents a number of limitations. First, despite randomising respondents to the three frame groups, there were significant differences in some observable characteristics. However, we were able to control for most of these factors through modelling and these did not appear to have large effects on estimates. Second, the price changes we applied were relatively small in absolute terms, and reflected market prices to keep the experiment realistic for the control group. This meant that tax rates were already included in the market prices and respondents in tax frame groups could have perceived the prices without the tax as relatively small and therefore exhibit lower price responsiveness. Also, the choice cards had slightly smaller font size for price where tax was indicated which could have influenced choices, probably leading to a weaker responsiveness to price. Third, the study asked about choices for the whole family and therefore would exclude the specific beverage choices respondents may make when they consider only themselves. It is therefore difficult to extrapolate our findings to SSB purchases for children specifically. Fourth, respondents could only choose one beverage in the DCE, whereas actual purchase data showed that in 24% of shopping occasions households purchased more than one drink. Thus, restricting choices may lead to an unrealistic situation and misrepresent actual preferences. Finally, despite a relatively large sample size of 603 respondents, the small effect sizes meant that the differences between the three groups were harder to detect at conventional statistical significance levels.

To conclude, our findings have potentially important policy implications suggesting that when SSB taxes are introduced, signaling and framing the tax as a health-related and earmarked measure may be effective in incentivizing a greater reduction in purchases of SSBs than a tax alone.

References

Afshin, A., Peñalvo, J. L., Del Gobbo, L., Silva, J., Michaelson, M., O'Flaherty, M., . . . Mozaffarian, D. (2017). The prospective impact of food pricing on improving dietary consumption: A systematic review and meta-analysis. *PLoS ONE, 12*(3), e0172277. doi: 10.1371/journal.pone.0172277

Andreyeva, T., Long, M. W., & Brownell, K. D. (2010). The Impact of Food Prices on Consumption: A Systematic Review of Research on the Price Elasticity of Demand for Food. *American Journal of Public Health, 100*(2), 216-222. doi: 10.2105/AJPH.2008.151415

Briggs, A., Mytton, O., Kehlbacher, A., Tiffin, R., Rayner, M., & Scarborough, P. (2013). Overall and income specific effect on prevalence of overweight and obesity of 20% sugar sweetened drink tax in UK: econometric and comparative risk assessment modelling study. *BMJ, 347:f6189*.

Briggs, A. D. M., Mytton, O. T., Kehlbacher, A., Tiffin, R., Elhussein, A., Rayner, M., . . . Scarborough, P. (2016). Health impact assessment of the UK soft drinks industry levy: a comparative risk assessment modelling study. *The Lancet Public Health, 2*(1), e15-e22. doi: 10.1016/S2468-2667(16)30037-8

Caro, J., Corvala´n, C., Reyes, M., Silva, A., Popkin, B., & Taillie, L. S. (2018). Chile's 2014 sugar-sweetened beverage tax and changes in prices and purchases of sugarsweetened beverages: An observational study in an urban environment. *Plos Medicine, 15*(7), e1002597.

Cawley, J., Frisvold, D., Hill, A., & Jones, D. (2019). The impact of the Philadelphia beverage tax on purchases and consumption by adults and children. *Journal of Health Economics, 67*, 102225. doi: https://doi.org/10.1016/j.jhealeco.2019.102225

Chen, X., Kaiser, H. M., & Rickard, B. J. (2015). The impacts of inclusive and exclusive taxes on healthy eating: An experimental study. *Food Policy, 56*, 13-24. doi: 10.1016/j.foodpol.2015.07.006

Chetty, R., Looney, A., & Kroft, K. (2009). Salience and Taxation: Theory and Evidence. *Am Econ Rev, 99*(4), 1145-1177.

ChoiceMetrics. (2012). Ngene 1.1.1 User Manual & Reference Guide. Australia.

Colchero, A., Popkin, B., Rivera, J., & Ng, S. (2016). Beverage purchases from stores in Mexico under the excise tax on sugar sweetened beverages: observational study. *BMJ, 352:h6704*.

Colson, G., & Grebitus, C. (2016). Relationship between Children's BMI and Parents' Preferences for Kids' Yogurts with and without Front of Package Health Signals. *Agribusiness, 33*(2), 151-159.

Cornelsen, L., & Carreido, A. (2015). Health-related taxes on food and beverages *Food Research Collaboration Policy Brief*. London.

Cremer, H., Goulao, C., & Roeder, K. (2016). Earmarking and the political support of fat taxes. *Journal of Health Economics, 50*, 258-267.

Dubois, P., Griffith, R., & O'Connell, M. (2017). *How well targeted are soda taxes?* CEPR Discussion Paper No DP12484. Retrieved from https://papers.ssrn.com/sol3/papers.cfm?abstract_id=3086139

Eykelenboom, M., van Stralen, M. M., Olthof, M. R., Schoonmade, L. J., Steenhuis, I. H. M., Renders, C. M., . . . on behalf of the, P. E. N. C. (2019). Political and public acceptability of a sugar-sweetened beverages tax: a mixed-method systematic review and meta-analysis. *International Journal of Behavioral Nutrition and Physical Activity, 16*(1), 78. doi: 10.1186/s12966-019-0843-0

Harding, M., & Lovenheim, M. (2017). The effect of prices on nutrition: Comparing the impact of product- and nutrient-specific taxes. *Journal of Health Economics, 53*, 53-71. doi: https://doi.org/10.1016/j.jhealeco.2017.02.003

Homonoff, T. A. (2018). Can Small Incentives Have Large Effects? The Impact of Taxes versus Bonuses on Disposable Bag Use. *American Economic Journal: Economic Policy, 10*(4), 177-210. doi: 10.1257/pol.20150261

Jenssen, M., & Hamm, U. (2012). Product labelling in the market for organic food: Consumer preferences and willingness-to-pay for different organic certification logos. *Food Quality and Preference, 25*(1), 9-22.

Krystallis, A., & Chrysochou, P. (2012). Do Health Claims and Prior Awareness Influence Consumers' Preferences for Unhealthy Foods? The Case of Functional Children's Snacks. *Agribusiness, 28*(1), 86-102.

McFadden, D. (1973). Conditional Logit Analysis of Qualitative Choice Behaviour. In P. Zarembka (Ed.), *Frontiers of Econometrics* (pp. 105-142). NY: Academic Press.

Nakamura, R., Mirelman, A., Cuadrado, C., Silva-Illanes, N., Dunstan, J., & Suhrcke, M. (2018). Evaluating the 2014 sugar-sweetened beverage tax in Chile: An observational study in urban areas. *Plos Medicine, 15*(7), e1002596.

Papoutsi, G., Nayga, R., Lazaridis, P., & Drichoutis, A. (2015). Fat tax, subsidy or both? The role of information and children's pester power in food choice. *Journal of Economic Behaviour & Orgaization, 117*, 196-208.

Redondo, M., Hernandes-Aguado, I., & Lumbreras, B. (2018). The impact of the tax on sweetened beverages: a systematic review. *Am J Clin Nut, 108*(3), 548-563.

Reed Johnson, F., Lancsar, E., Marshall, D., Kilambi, V., Muhlbacher, A., Regier, D. A., . . . Bridges, J. F. (2013). Constructing experimental designs for discrete-choice experiments: report of the ISPOR Conjoint Analysis Experimental Design Good Research Practices Task Force. *Value Health, 16*(1), 3-13. doi: 10.1016/j.jval.2012.08.2223

Seah, S., Rebello, S., Tai, B., Tay, Z., Finkelstein, E., & van Dam, R. (2018). Impact of tax and subsidy framed messages on high- and lower-sugar beverages sold in vending machines: a randomized crossover trial. *International Journal of Behavioural Nutrition and Physical Activity, 15*(76), 1-9.

Silver, L., Ng, S., Ryan-Ibarra, S., Smith Taillie, L., Induni, M., Miles , D., . . . Popkin, B. (2017). Changes in prices, sales, consumer spending, and beverage consumption one year after a tax on sugar-sweetened beverages in Berkeley, California, US: A before-and-after study. *Plos Medicine, 14*(4), e1002283.

Smith, R. D., Cornelsen, L., Quirmbach, D., Jebb, S. A., & Marteau, T. M. (2018). Are sweet snacks more sensitive to price increases than sugar-sweetened beverages: analysis of British food purchase data. *BMJ Open, 8*(4), e019788. doi: 10.1136/bmjopen-2017-019788

StataCorp. (2017). Stata Base Reference Manual Release 15. College Station, TX: Stata Press. Retrieved from https://www.stata.com/manuals13/rclogit.pdf

StataCorp. (2019). Stata Statistical Software: Release 16. College Station, TX: Stata Statistical Software: Release 16.

Tait, P., Saunders, C., Guenther, M., & Rutherford, P. (2016). Emerging versus developed economy consumer willingness to pay for environmentally sustainable food production: a choice experiment approach comparing Indian, Chinese and United Kingdom lamb consumers. *Journal of Cleaner Production, 124*(15), 65-72.

Teng, A. M., Jones, A. C., Mizdrak, A., Signal, L., Genç, M., & Wilson, N. (2019). Impact of sugar-sweetened beverage taxes on purchases and dietary intake: Systematic review and meta-analysis. *Obesity Reviews, 20*(9), 1187-1204. doi: 10.1111/obr.12868

WCRF. (2018). Building momentum: lessons on implementing a robust sugar sweetened beverage tax World Cancer Research Fund International.

WHO. (2018). Tackling NCDs: 'Best buys' and other recommended interventions for the prevention and control of noncommunicable diseases: World Health Organisation.

Wilson, A., Buckley, E., Buckley, J., & Bogomolova, S. (2016). Nudging healthier food and beverage choices through salience and priming. Evidence from a systematic review. *Food Quality and Preference, 51*, 47-64.

Tables

Table 1. Survey experiment design

Group	Price	Framing message shown prior to DCE
control	Market price	n/a
'health frame'	Market price, including a tax of 20% or 40% on SSBs	The **price of sugary drinks includes a tax** ranging from 20% to 40%. The tax has been applied because consuming high levels of added sugar has been shown to have links to weight gain, obesity, poor oral health and higher risk of diseases such as diabetes and cardio-vascular diseases. Sugar-sweetened beverages are the largest source of added sugar in diet. A tax on sugary drinks has been shown to be an effective measure to reduce consumption in countries where it has been implemented (Mexico, for example) .
'health and earmark frame'	Market price, including a tax of 20% or 40% on SSBs	The **price of sugary drinks includes a tax** ranging from 20% to 40%. The tax has been applied because consuming high levels of added sugar has been shown to have links to weight gain, obesity, poor oral health and higher risk of diseases such as diabetes and cardio-vascular diseases. Sugar-sweetened beverages are the largest source of added sugar in diet. A tax on sugary drinks has been shown to be an effective measure to reduce consumption of these drinks in countries where it has been implemented (Mexico, for example). **Revenues from the tax** would be used to support nutritional education and physical sport activities of school-aged children.

Table 2. Alternatives, attributes and attribute levels

Alternative / Attribute	**SSB**	**Diet (no/low-sugar) beverage**	**Pure fruit juice**	**Water**
Type of product	Fizzy Juice drink Squash/cordial	Fizzy Juice drink Squash/cordial	Pure juice Smoothie	Still Sparkling
Branding	Branded Non-branded	Branded Non-branded	Branded Non-branded	Branded Non-branded
Price per L (£)	Non-branded fizzy and juice drinks (0.3, 0.4, 0.5, 0.6) Branded fizzy and juice drinks (0.6, 0.8, 1.1, 1.4) Non-branded squash (0.6, 0.8, 1.1, 1.4) Branded squash (1.4, 2.3, 3.0, 3.5)		Non-branded (1.6, 2.0, 2.5) Branded (2.5, 2.8, 3.1)	Non-branded (0.1, 0.15, 0.3) Branded (0.3, 0.5, 0.8)
Tax*	20%, 40%	n/a	n/a	n/a

Note: *the tax attribute applied only in ‘health’ and ‘health and earmark’ frame.

Table 3. Descriptive statistics and balance checks

	Control (n=205)	Health frame (n=211)	Health and earmark frame (n=187)	P-value of test of difference across the three groups[a]
Household size	4.15 (0.96)	3.96 (1.03)	4.07 (1.08)	0.038**
Number of adults	2.23 (0.67)	2.22 (0.65)	2.23 (0.72)	0.959
Number of kids (<18y old)	1.92 (0.85)	1.74 (0.88)	1.84 (0.85)	0.034**
Age of main shopper	44 (8.1)	43 (8.3)	45 (8.3)	0.20
Health related				
Has diabetes (%)	3.41	5.21	6.42	0.386
Is on a diet (%)	2.44	3.79	10.16	0.001**
Is pregnant or breastfeeding (%)	2.44	1.90	2.67	0.868
Usual purchases (L per household member/week (SD))*				
SSB	0.67 (0.68)	0.70 (0.62)	0.62 (0.62)	0.529
Diet/Low sugar	0.89 (0.85)	0.98 (0.97)	0.85 (1.03)	0.115
Pure juice	0.08 (0.17)	0.11 (0.20)	0.08 (0.16)	0.432
Water	0.26 (0.50)	0.31 (0.58)	0.33 (0.65)	0.618
Knows UK levy (%)				0.346
Yes	47.32	38.39	45.45	
No	25.85	31.28	29.95	
Yes, but not sure what it means	26.83	30.33	24.60	
Support towards UK levy (%)				0.001**
Supports	28.29	30.81	45.45	
Does not support	48.78	32.70	31.02	
Unsure	22.93	36.49	23.53	

*calculated from home-scan data for 2017

[a] For continuous variables, we performed a Kruskal-Wallis Chi-square test; for categorical variables, we used a Pearson Chi-square test. * p<0.1; **p<0.05

Table 4. Mixed Logit estimates

Variable	SSBs		Diet beverages		Pure juice		Water	
	Coef.	**SE**	**Coef.**	**SE**	**Coef.**	**SE**	**Coef.**	**SE**
ASC	1.095**	0.314	1.490**	0.387	-1.261**	0.622	-2.491**	0.482
SD	*0.465*	*0.064*	*0.591*	*0.057*	*0.742*	*0.101*	*0.733*	*0.079*
x frame H	-0.665	0.457	-0.298	0.522	-1.499*	0.895	2.447**	0.658
x frame HE	-0.185	0.467	-0.089	0.538	-0.157	0.922	0.742	0.668
beverage type (a) [1]	-0.085	0.082	-0.894**	0.189	0.840**	0.091	0.787**	0.090
x frame H	0.019	0.117	-0.159	0.254	-0.004	0.127	-0.192	0.131
x frame HE	-0.208*	0.123	-0.263	0.265	0.273*	0.137	0.152	0.129
beverage type (b) [1]	-0.311**	0.086	-1.407**	0.185				
x frame H	-0.112	0.121	-0.272	0.255				
x frame HE	-0.023	0.126	-0.485*	0.267				
Branded beverage	0.231**	0.075	0.006	0.081	-0.724**	0.122	0.100	0.127
x frame H	-0.018	0.106	0.096	0.110	-0.037	0.177	-0.357**	0.177
x frame HE	-0.055	0.109	0.019	0.115	0.031	0.188	-0.223	0.167
Tax 40% frame H	-0.032	0.053						
Tax 40% frame HE	0.092	0.057						
Price	-0.602**	0.141	-0.624**	0.150	-0.627**	0.246	-3.811**	0.779
SD	*0.748*	*0.067*	*0.721*	*0.069*	*0.624*	*0.059*	*3.858*	*0.403*
x frame H	-0.087	0.198	0.047	0.197	0.383	0.342	0.570	0.984
x frame HE	-0.358*	0.208	0.096	0.209	-0.340	0.354	1.593*	0.911
Volume	0.359**	0.137	0.552**	0.125	0.236	0.970	2.490**	0.390
SD	*0.238*	*0.139*	*0.248*	*0.062*	*0.973*	*1.013*	*0.925*	*0.141*
x frame H	0.200	0.204	0.184	0.160	1.392	1.248	-0.892**	0.452
x frame HE	0.028	0.253	0.008	0.158	0.078	1.387	-0.897*	0.519
No health cond.[2]	0.056	0.136	-0.154	0.143	0.240	0.219	-0.026	0.251
x frame H	-0.020	0.188	0.148	0.190	-0.460	0.297	0.285	0.319
x frame HE	0.009	0.174	0.132	0.182	-0.217	0.293	-0.022	0.303
Income	-0.005	0.004	-0.010**	0.005	0.008	0.007	0.020**	0.007
x frame H	0.008	0.006	0.010	0.007	0.011	0.011	-0.035**	0.010
x frame HE	0.011*	0.006	0.001	0.007	0.001	0.010	-0.020*	0.010
Number of kids	0.026	0.084	0.192**	0.090	-0.037	0.133	0.059	0.138
x frame H	0.182	0.122	0.027	0.126	0.272	0.198	-0.717**	0.216
x frame HE	-0.150	0.127	-0.003	0.132	0.227	0.221	-0.128	0.208

Notes: * p<0.1; **p<0.05; frame H ('health'), frame HE ('health and earmark'). Alternatives are presented in columns for presentational purposes, the model was estimated including all the variables listed in each row for each of the alternative beverage groups. N=7,236; log-likelihood -9018.4; normally distributed random parameters. Categorical variables were effects coded; [1] beverage types were for SSBs: fizzy (a), juice drink (b), squash/cordial (excluded); for diet beverages: fizzy (a), juice drink (b), squash/cordial (excluded); for juice: pure

juice (a), smoothie (excluded); water: still (a) , sparkling (excluded). [2]"No health conditions" indicates those respondents who did not indicate any conditions (on diet, with diabetes, pregnant/breastfeeding).

Table 5. Comparison of revealed and stated choices in the control group

	Home-scan data, all observations		**Home-scan data, one alternative chosen per shopping occasion**		**DCE data**	
	MNL estimates					
Variable	Coef.	SE	Coef.	SE	Coef.	SE
ASC (SSB)	0.808**	0.016	0.887**	0.026	0.787**	0.082
ASC (Diet)	0.827**	0.013	0.962**	0.023	1.115**	0.085
ASC (Juice)	-1.225**	0.023	-2.009**	0.058	-0.481**	0.123
ASC (Water)	-1.065**	0.021	-1.447**	0.043	-1.271**	0.117
Price	-0.415**	0.020	-0.353**	0.028	-0.294**	0.057
Alternative	**Predicted choice probability at sample averages**					
SSB	0.263		0.186		0.311	
Diet	0.299		0.221		0.282	
Juice	0.039		0.012		0.110	
Water	0.054		0.023		0.107	
No Choice	0.352		0.563		0.190	
Pseudo r2	0.180		0.315		0.097	
n	22,936		17,499		2,460	
Price elasticity	-0.33		-0.32		-0.21	

Notes: **p<0.05

Figures

Figure 1. Example of a choice set for ‘health’ and ‘health and earmark’ tax frame groups

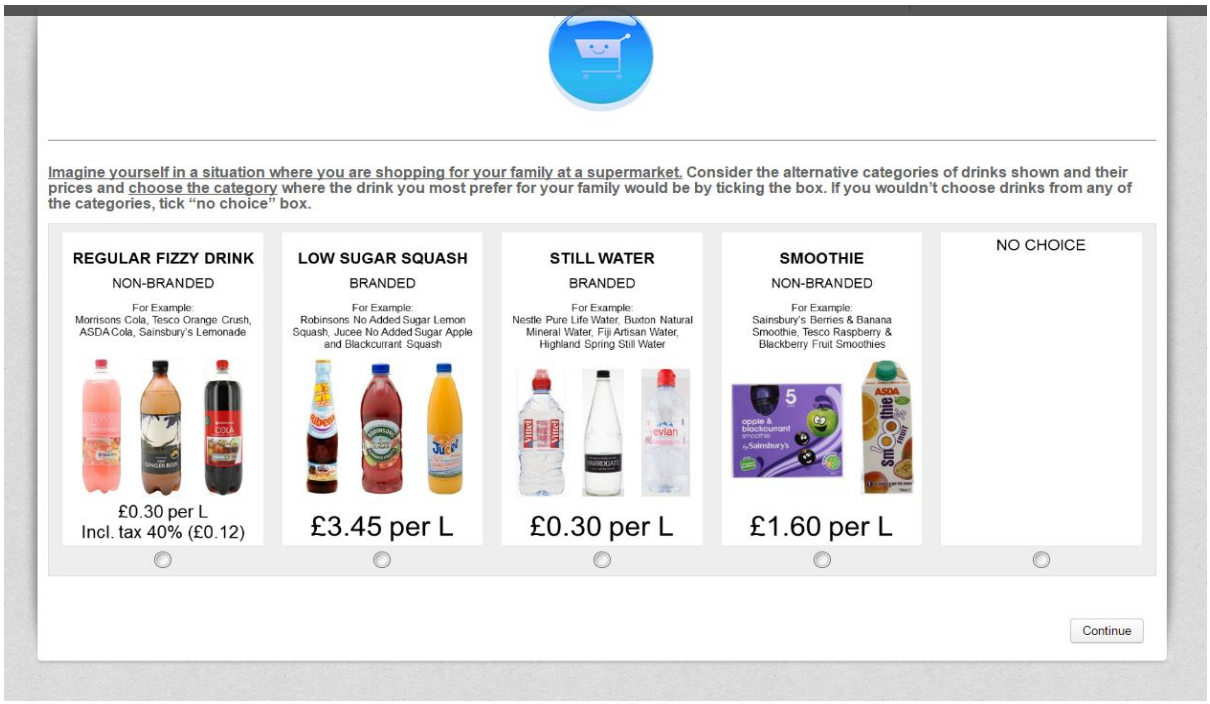


Figure 2. Unadjusted choices of beverages in the DCE, by tax frame

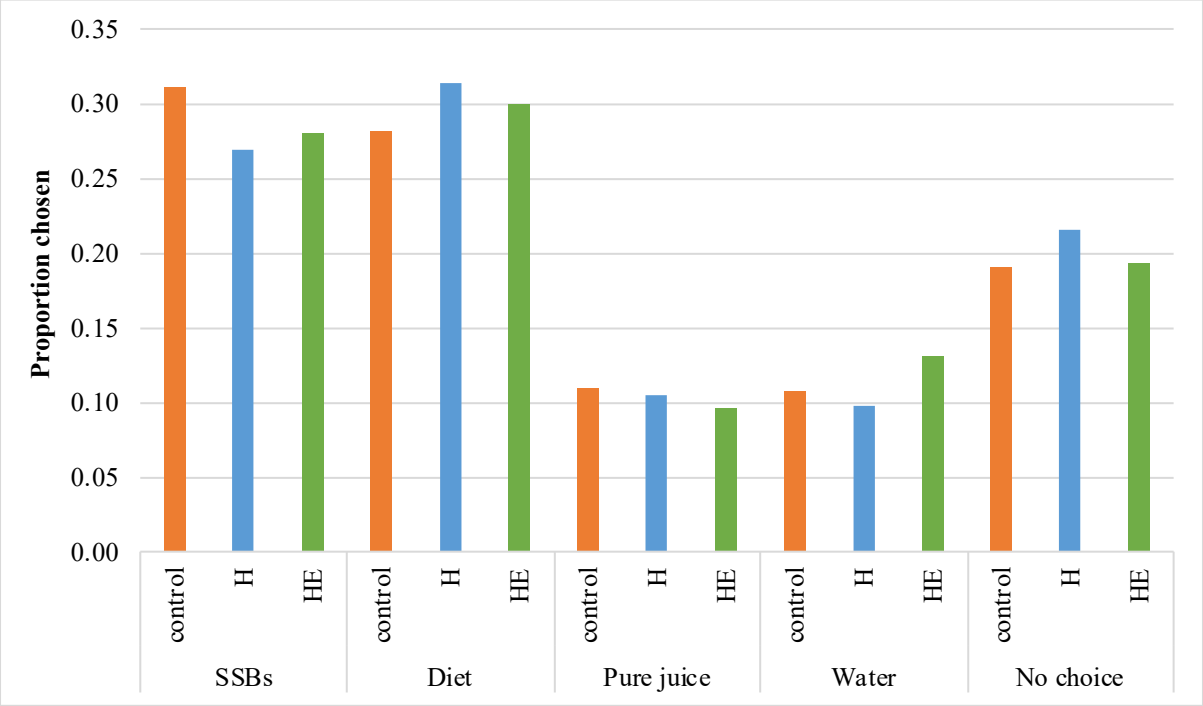
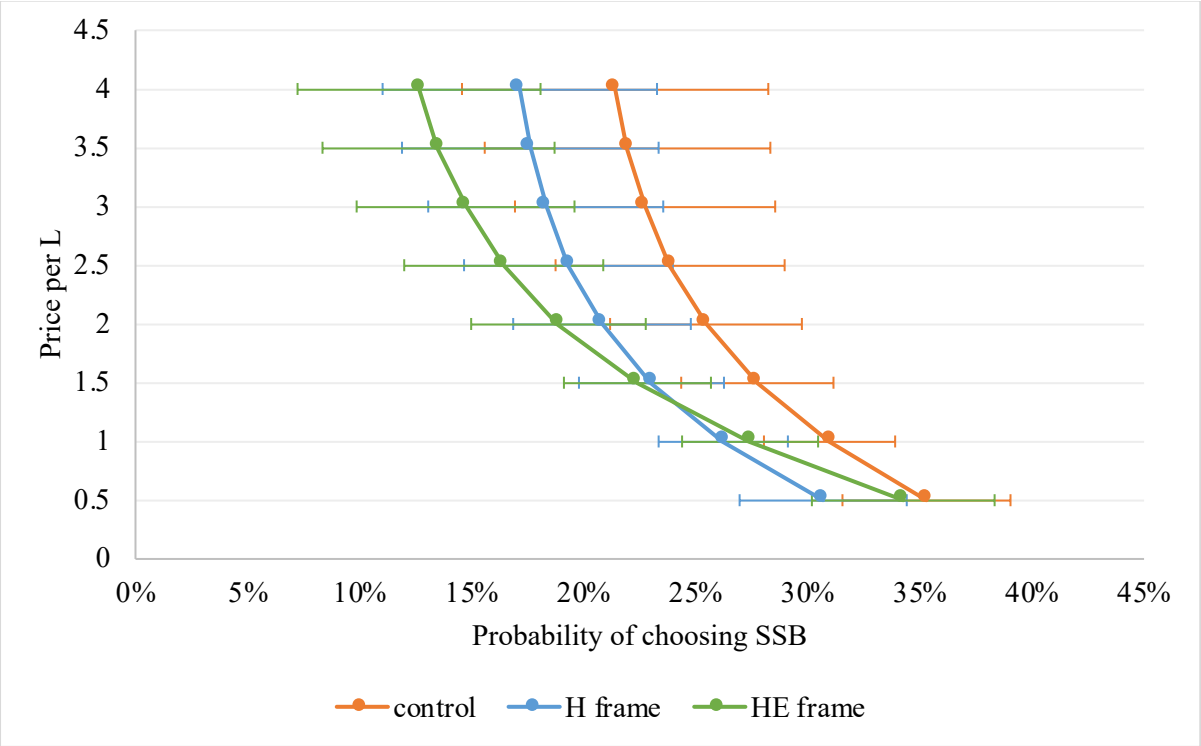


Figure 3. Predicted demand for SSBs, under different tax frames



Notes: Predicted probability of choosing SSBs at fixed price levels and with remaining covariates at sample mean; estimated from mixed logit model presented in table 4. Average price for SSBs in the DCE was £1.06/L. 'H' – health frame; 'HE' – health and earmark frame.

Figure 4. Simulated effects of a 20% or 40% (tax) price increase of SSBs on the predicted choices of beverages

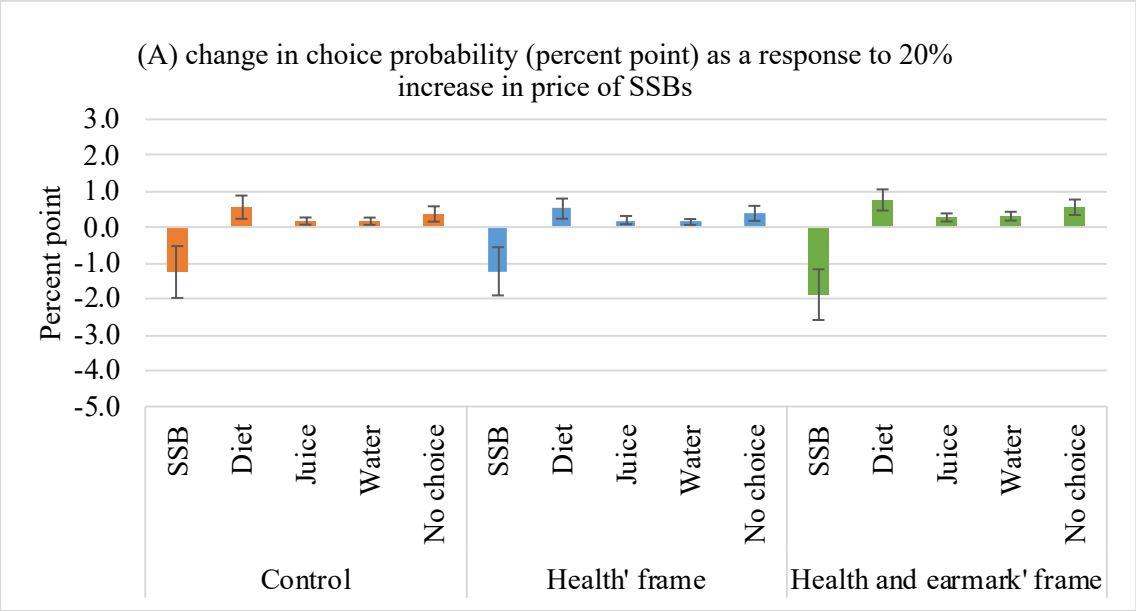
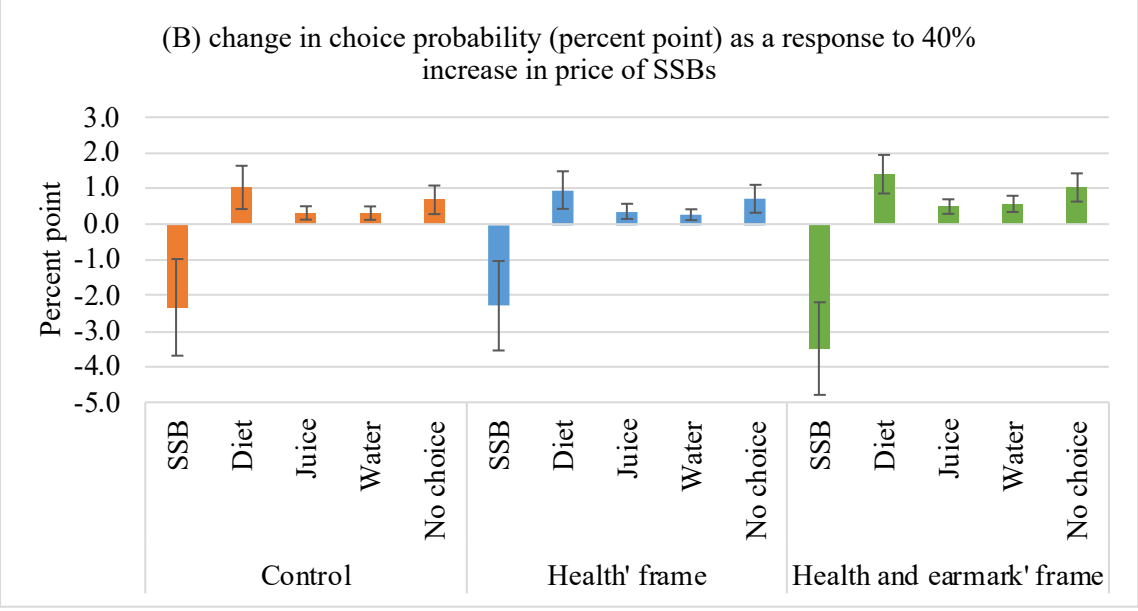


Figure 5. Simulated effects of a 40% (tax) price increase of SSBs on the predicted choices of beverages



Notes: estimated at sample average values when price of SSBs increases by 20% or 40%; based on the mixed logit model presented in table 4; 95% Confidence Intervals.

Figure 6. Probability of choosing SSBs by support to policy taxing sugary drinks (yes/unsure/no)

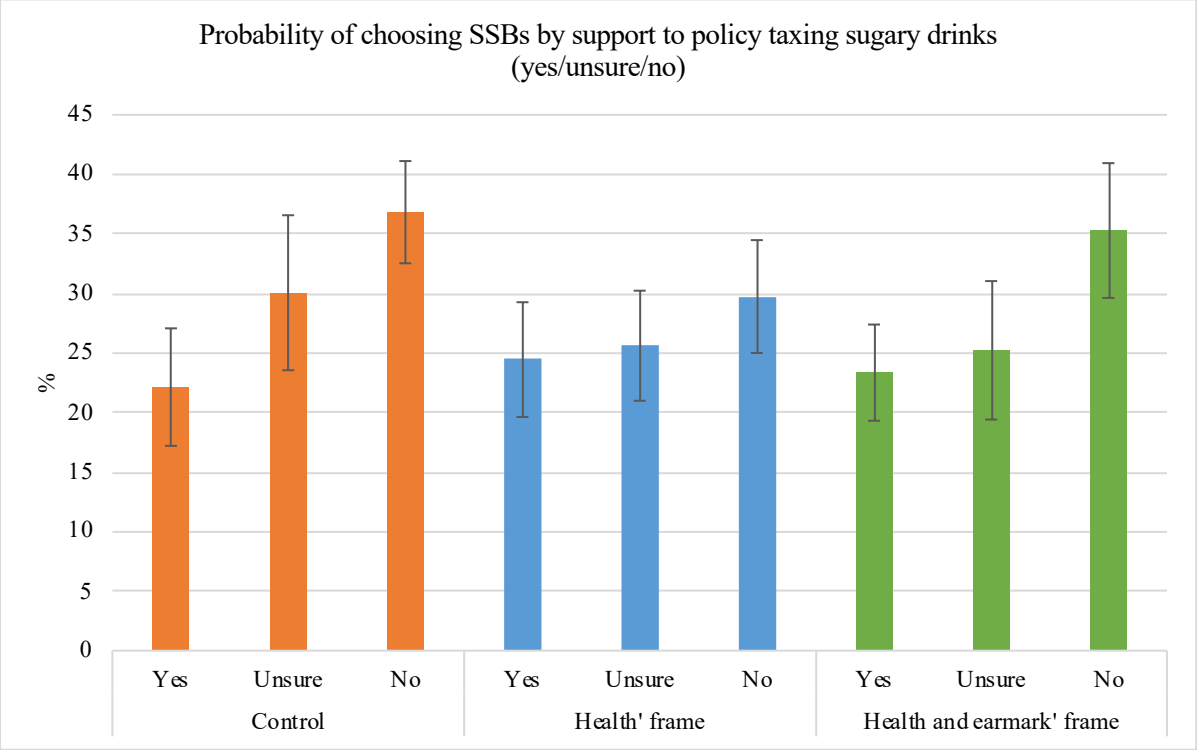
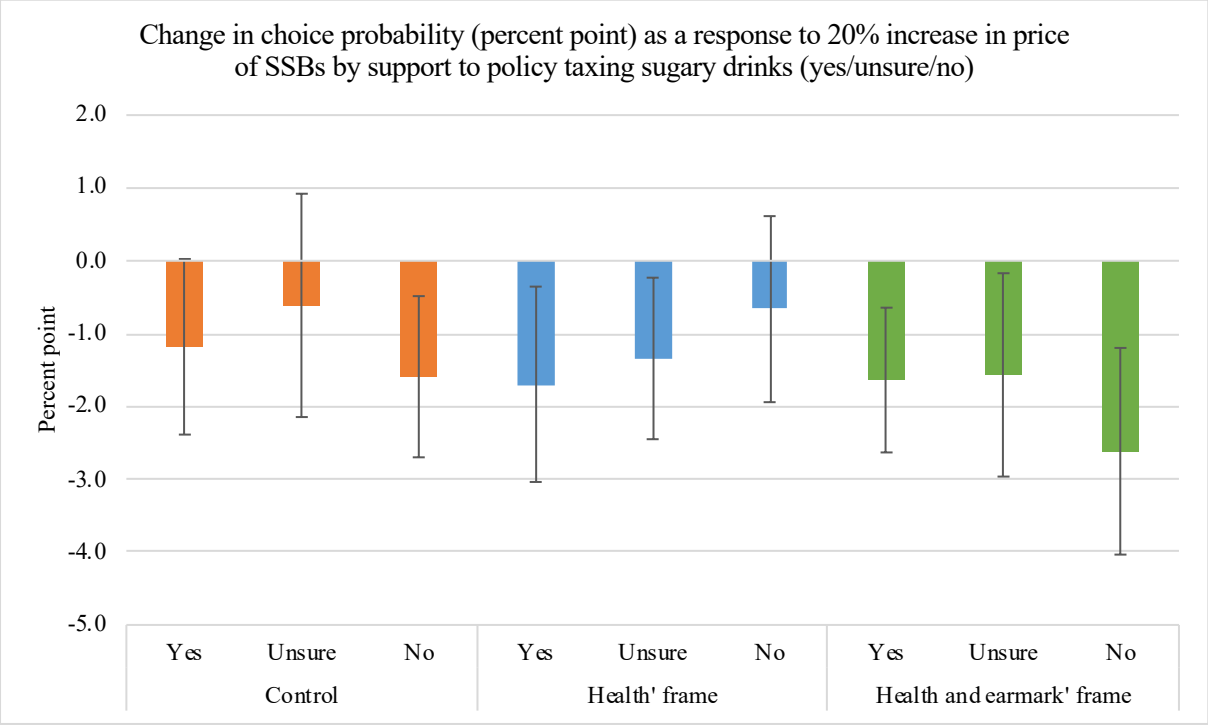


Figure 7. Change in choice probability (percent point) as a response to 20% increase in price of SSBs by support to policy taxing sugary drinks (yes/unsure/no)



Appendices

Survey questionnaire

[page 1 Information sheet]

IMPACT OF PRICE ON THE CHOICE OF SOFT DRINKS

This study, investigates people's choices of soft drinks and how people react to changes in the price of soft drinks.

You have been invited to participate as we are studying the choices of a wide range of people who drink soft drinks so we can look at diverse influences on people's choices and reactions to price changes.

We will ask you to consider categories of soft drinks with accompanying information on its prices and we ask you to indicate your preferred choice when shopping for your family. The choices are straightforward to complete. Finally, we will ask you some questions about who consumes these drinks in your family so we can investigate any differences in preferences between people. The questionnaire will take up to 15 minutes to complete.

The results of the survey will be presented at conferences and written for publication in journals. These will not personally identify you or members of your household.

No personal details will be held by the research team. Anonymised data will be securely stored by the research team for a minimum of ten years post publication.

Please tick the box next to each statement that you agree to:

□ I confirm that I have read and understand the information provided above

□ I agree that data gathered in this study may be stored anonymously and securely by the research team

□ I agree to take part in this study

[page 2: Pre-screening question]

Select any that applies to you:

a) I have diabetes
b) I am on a strict diet to lose weight
c) I am pregnant or breastfeeding

[page 3: Instructions depending on which arm the respondent is randomly selected into]

Control group

You will see 12 sets of different categories of soft drinks from which you have to choose the preferred category of drinks for your family (e.g. fizzy drinks, juices, water). There are no right or wrong answers, it is about what you and your family likes.

Price of the drinks is indicated **as per litre** and **applies to any drink in that category**. It may vary from what you are used to see in the supermarket. When making the choice consider only the price shown.

When making the choice **imagine yourself in a situation where you are shopping for your family at a supermarket**. Consider the alternative categories of drinks shown and their

prices and **choose the category** where the drink you most prefer for your family would be by ticking the box.

Each category contains many individual products and some examples are provided. When answering **please consider all the different drinks in each category**, and not just the ones shown on the picture.

If you wouldn't choose drinks from any of the categories, tick "no choice" box.

'Health' frame group

You will see 12 sets of different categories of soft drinks from which you have to choose the preferred category of drinks for your family (e.g. fizzy drinks, juices, water). There are no right or wrong answers, it is about what you and your family likes.

Price of the drinks is indicated **as per litre** and **applies to any drink in that category**. It may vary from what you are used to see in the supermarket. When making the choice consider only the price shown.

The **price of sugary drinks includes a tax** ranging from 20% to 40%. The tax has been applied because consuming high levels of added sugar has been shown to have links to weight gain, obesity, poor oral health and higher risk of diseases such as diabetes and cardio-vascular diseases. Sugar-sweetened beverages are the largest source of added sugar in diet. A tax on sugary drinks has been shown to be an effective measure to reduce consumption in countries where it has been implemented (Mexico, for example).

When making the choice **imagine yourself in a situation where you are shopping for your family at a supermarket**. Consider the alternative categories of drinks shown and their prices and **choose the category** where the drink you most prefer for your family would be by ticking the box.

Each category contains many individual products and some examples are provided. When answering **please consider all the different drinks in each category**, and not just the ones shown on the picture.

If you wouldn't choose drinks from any of the categories, tick "no choice" box.

'Health and earmark' frame

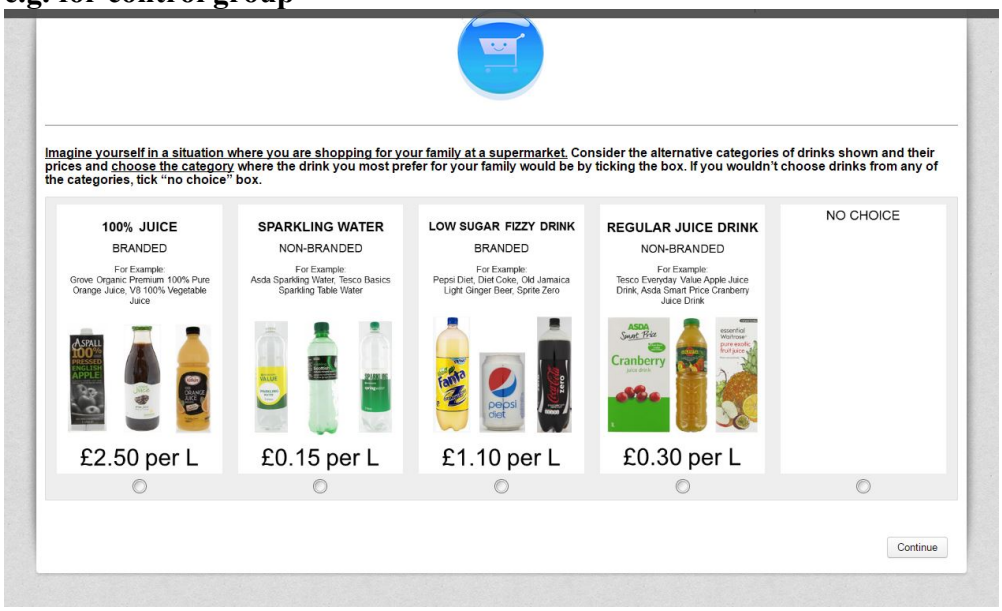
You will see 12 sets of different categories of soft drinks from which you have to choose the preferred category of drinks for your family (e.g. fizzy drinks, juices, water). There are no right or wrong answers, it is about what you and your family likes.

Price of the drinks is indicated **as per litre** and **applies to any drink in that category**. It may vary from what you are used to see in the supermarket. When making the choice consider only the price shown.

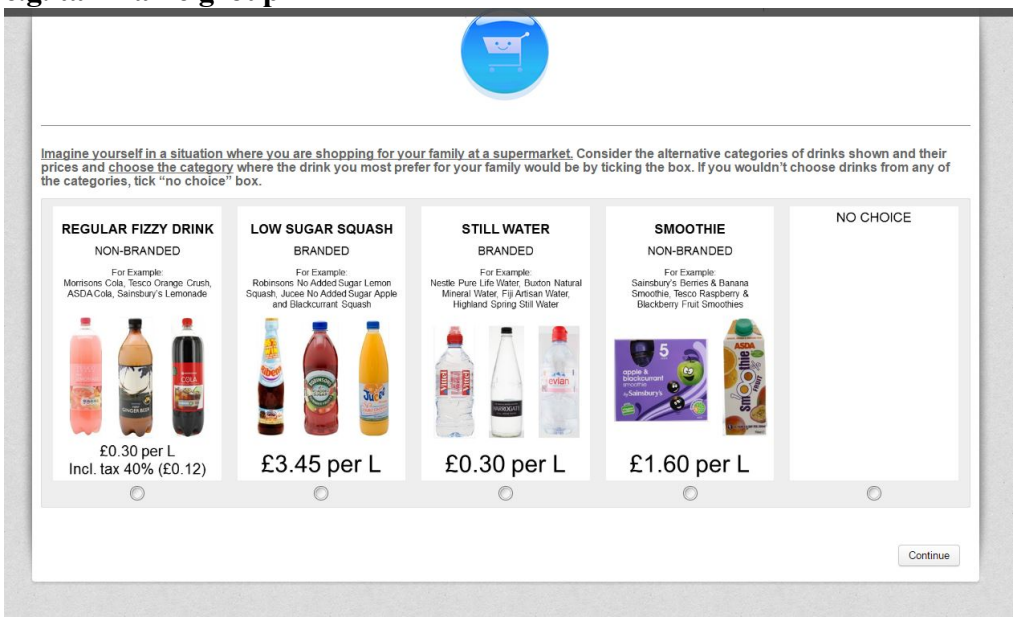
The **price of sugary drinks includes a tax** ranging from 20% to 40%. The tax has been applied because consuming high levels of added sugar has been shown to have links to weight gain, obesity, poor oral health and higher risk of diseases such as diabetes and cardio-vascular diseases. Sugar-sweetened beverages are the largest source of added sugar in diet. A tax on sugary drinks has been shown to be an effective measure to reduce consumption of these drinks in countries where it has been implemented (Mexico, for example). **Revenues from the tax** would be used to support nutritional education and physical sport activities of school aged children

When making the choice **imagine yourself in a situation where you are shopping for your family at a supermarket**. Consider the alternative categories of drinks shown and their prices and **choose the category** where the drink you most prefer for your family would be by ticking the box.
Each category contains many individual products and some examples are provided. When answering **please consider all the different drinks in each category**, and not just the ones shown on the picture.
If you wouldn't choose drinks from any of the categories, tick "no choice" box.

[page 4-16: choice situations 1-12]
e.g. for control group



e.g. tax frame group



[page 17: post-choice questions]

1. Did you know about the UK Government plan to implement a soft drink industry levy ("soda tax") on sugar-sweetened beverages from April 2018?

a. Yes
b. No
c. Have heard of it but not sure what it means

2. In principle, do you support the implementation of the soft drink industry levy ("soda tax") on sugar-sweetened beverages?

a. Yes
b. No
c. Not sure

Table A1. Additional descriptive statistics

	A (n=205)	**B (n=211)**	**C (n=187)**
Region (%) (Pearson χ2=15.4, p=0.634)			
Anglia	6.8	7.6	11.8
Lancashire	14.6	14.7	8.0
London	13.7	14.2	13.9
Midlands	18.5	20.4	17.1
North East	5.9	5.2	3.7
Scotland	6.3	7.6	9.1
South	10.2	9.5	13.9
South West	2.0	2.8	4.3
Wales & West	8.3	6.6	8.0
Yorkshire	13.7	11.4	10.2
Socio-economic status (%) (Pearson χ2=8.7, p=0.367)			
AB (highest)	17.6	14.7	18.7
C1	40.5	32.7	36.9
C2	16.6	24.2	22.5
D	20.5	21.3	15.5
E (lowest)	4.9	7.1	6.4
Income (%) (Pearson χ2=9.8, p=0.875)			
Did not want to answer	15.1	14.2	13.4
£0 - £9,999 pa	3.4	5.2	2.7
£10,000 - £19,999 pa	15.6	13.7	16.0
£20,000 - £29,999 pa	18.5	16.6	20.9
£30,000 - £39,999 pa	18.5	18.5	19.3
£40,000 - £49,999 pa	12.7	13.7	8.6
£50,000 - £59,999 pa	6.8	8.1	10.2
£60,000 - £69,999 pa	4.9	5.2	2.7
£70,000 +	4.4	4.7	6.4
Highest qualification (%) (Pearson χ2=6.7, p=0.878)			
Degree or higher	25.4	27.0	25.1
Higher education	20.0	15.2	19.3
A Level	18.1	15.2	19.8
GCSE	26.3	33.2	27.3
Other	7.3	6.6	5.4
None	2.9	2.4	2.7
Unknown	0.0	0.5	0.5
Tenure (%)(Pearson χ2= 8.3, p=0.460)			
Owned outright	16.1	13.3	17.1
Mortgaged	52.7	53.1	54.0
Rented	30.2	33.2	26.2
Other	1.0	0.0	2.1

Unknown	0.0	0.5	0.5

Table A2. Estimation results of Multinomial Logit (MNL) model

	SSBs			Diet beverages			Pure Juice			Water		
	Coef	**SE**	**p-value**	**Coef**	**SE**	**p-value**	**Coef**	**SE**	**p-value**	**Coef**	**SE**	**p-value**
ASC	**0.763**	**0.247**	**0.002**	**1.155**	**0.288**	**<0.001**	**-1.245**	**0.43**	**0.004**	**-2.011**	**0.365**	**<0.001**
* frame H	**-0.598**	**0.359**	**0.096**	0.119	0.408	0.77	-1.06	0.696	0.128	**1.661**	**0.568**	**0.003**
* frame HE	-0.182	0.361	0.613	0.335	0.432	0.438	0.018	0.687	0.979	0.302	0.548	0.582
beverage type (a) [1]	-0.068	0.081	0.397	**-0.641**	**0.173**	**<0.001**	**0.671**	**0.118**	**<0.001**	**0.635**	**0.119**	**<0.001**
* frame H	0.02	0.11	0.857	-0.154	0.236	0.514	-0.03	0.155	0.845	-0.222	0.166	0.181
* frame HE	-0.146	0.123	0.236	-0.241	0.237	0.309	0.19	0.179	0.287	0.044	0.164	0.79
beverage type (b) [1]	**-0.252**	**0.081**	**0.002**	**-1.08**	**0.162**	**<0.001**						
* frame H	-0.081	0.118	0.493	-0.252	0.228	0.268						
* frame HE	0.007	0.126	0.958	**-0.398**	**0.231**	**0.085**						
Branded beverage	**0.17**	**0.073**	**0.019**	-0.047	0.083	0.57	**-0.515**	**0.105**	**<0.001**	0.009	0.104	0.928
* frame H	-0.012	0.097	0.902	0.117	0.107	0.274	-0.055	0.166	0.74	-0.231	0.152	0.127
* frame HE	-0.066	0.108	0.537	0.048	0.11	0.666	0.048	0.167	0.774	-0.132	0.132	0.316
Tax 40% frame H	-0.03	0.047	0.521									
Tax 40% frame HE	**0.09**	**0.044**	**0.04**									
Price	**-0.317**	**0.092**	**0.001**	**-0.291**	**0.106**	**0.006**	-0.191	0.161	0.237	**-0.6**	**0.316**	**0.058**
* frame H	-0.01	0.126	0.935	-0.053	0.135	0.694	0.289	0.238	0.226	0.505	0.504	0.316
* frame HE	-0.201	0.13	0.123	0.028	0.141	0.844	-0.286	0.242	0.238	**0.851**	**0.449**	**0.058**
Volume	**0.294**	**0.1**	**0.003**	**0.324**	**0.083**	**<0.001**	0.212	0.513	0.679	**1.222**	**0.267**	**<0.001**
* frame H	0.219	0.144	0.128	0.029	0.138	0.835	-0.07	0.698	0.92	-0.376	0.322	0.243
* frame HE	-0.056	0.147	0.706	-0.099	0.205	0.628	-0.103	0.758	0.892	-0.507	0.346	0.143
No health cond.[2]	0.015	0.106	0.888	**-0.226**	**0.132**	**0.089**	0.021	0.207	0.919	0.248	0.194	0.201
* frame H	0.012	0.136	0.932	0.177	0.162	0.275	-0.181	0.245	0.46	-0.071	0.25	0.776
* frame HE	0.099	0.146	0.497	-0.001	0.165	0.996	0.059	0.237	0.802	-0.162	0.218	0.458
Income	-0.003	0.003	0.422	-0.005	0.004	0.219	**0.01**	**0.005**	**0.039**	0.005	0.005	0.297
* frame H	0.004	0.005	0.375	0.001	0.005	0.914	0.007	0.008	0.388	-0.009	0.008	0.217
* frame HE	0.006	0.004	0.217	-0.005	0.005	0.322	-0.006	0.008	0.462	0.003	0.007	0.646
Number of kids	0.045	0.063	0.473	**0.142**	**0.083**	**0.087**	-0.028	0.095	0.769	0.097	0.099	0.329
* frame H	0.151	0.093	0.103	0.049	0.106	0.642	0.178	0.132	0.177	**-0.669**	**0.173**	**<0.001**
* frame HE	-0.096	0.1	0.336	-0.008	0.109	0.945	0.168	0.155	0.281	-0.246	0.158	0.12

Notes: Alternatives are presented in columns for presentational purposes, the model was estimated including all the variables listed in each row for each of the alternative beverage groups. Categorical variables were effects coded; [1] beverage types were for SSBs: fizzy (a), juice drink (b), squash/cordial (excluded); for diet beverages: fizzy (a), juice drink (b), squash/cordial(excluded); for juice: pure juice (a), smoothie (excluded); water: still (a), sparkling (excluded). [2]" No health conditions" indicates those respondents who did not indicate any conditions (on diet, with diabetes, pregnant/breastfeeding). N=7,236; LL=-10113. Figures in bold indicate where coefficient was significant at least at 10% level. H- 'health' frame, HE – 'health and earmark' frame

Table A3 Mixed logit model estimates in subsamples based on support to UK levy on soft drinks

MXL estimation	Subsamples based on support to UK levy on soft drinks								
	Support			Do not support			Unsure if support		
	coef	SE	p	coef	SE	p	coef	SE	p
SSBs									
ASC	**0.792**	**0.387**	**0.041**	**1.291**	**0.282**	**<0.001**	0.553	0.395	0.162
SD	*0.564*	*0.109*		*0.298*	*0.122*		*0.615*	*0.109*	
* frame H	0.040	0.538	0.94	-0.448	0.460	0.331	0.491	0.521	0.346
* frame HE	-0.211	0.521	0.685	0.168	0.480	0.727	0.353	0.578	0.542
beverage type (a) [1]	**-0.591**	**0.179**	**0.001**	0.048	0.114	0.677	0.094	0.174	0.587
* frame H	0.301	0.238	0.205	0.065	0.181	0.721	-0.139	0.223	0.533
* frame HE	-0.165	0.233	0.479	-0.038	0.195	0.846	-0.066	0.257	0.797
beverage type (b) [1]	-0.132	0.175	0.452	**-0.410**	**0.122**	**0.001**	-0.258	0.180	0.151
* frame H	-0.357	0.235	0.129	0.269	0.187	0.150	-0.371	0.231	0.109
* frame HE	0.096	0.226	0.669	-0.134	0.200	0.505	-0.409	0.273	0.134
Branded beverage	0.198	0.155	0.203	**0.326**	**0.107**	**0.002**	0.056	0.156	0.721
* frame H	-0.162	0.210	0.439	-0.057	0.166	0.730	0.256	0.200	0.201
* frame HE	-0.243	0.201	0.227	0.198	0.175	0.258	0.005	0.227	0.982
Tax 40% frame H	0.036	0.099	0.719	0.040	0.089	0.651	**-0.146**	**0.089**	**0.099**
Tax 40% frame HE	0.085	0.089	0.34	**0.202**	**0.097**	**0.037**	-0.032	0.124	0.799
Price	**-0.811**	**0.298**	**0.006**	**-0.628**	**0.200**	**0.002**	-0.328	0.280	0.241
SD	*0.854*	*0.123*		*0.775*	*0.096*		*0.585*	*0.127*	
* frame H	-0.225	0.402	0.576	0.189	0.313	0.546	-0.296	0.349	0.397
* frame HE	-0.278	0.390	0.477	-0.389	0.333	0.242	-0.453	0.409	0.268
Volume	0.354	0.551	0.52	**0.374**	**0.172**	**0.029**	0.149	0.213	0.486
* frame H	0.135	0.700	0.847	0.249	0.259	0.337	0.419	0.321	0.191
* frame HE	0.610	0.641	0.342	-0.275	0.265	0.298	0.007	0.341	0.984
Diet beverages									
ASC	**1.836**	**0.494**	**<0.001**	**1.565**	**0.408**	**<0.001**	0.698	0.528	0.186
SD	*0.677*	*0.099*		*0.785*	*0.097*		*0.374*	*0.129*	
* frame H	-0.652	0.651	0.316	-0.435	0.605	0.472	**1.763**	**0.650**	**0.007**
* frame HE	-0.018	0.624	0.977	-0.781	0.628	0.214	0.832	0.721	0.249
beverage type (a) [1]	**-1.400**	**0.367**	**<0.001**	**-0.683**	**0.279**	**0.014**	**-0.872**	**0.383**	**0.023**
* frame H	0.012	0.481	0.981	0.124	0.421	0.769	-0.302	0.467	0.518
* frame HE	-0.167	0.460	0.716	-0.074	0.448	0.868	-0.119	0.528	0.822
beverage type (b) [1]	**-1.819**	**0.345**	**<0.001**	**-1.360**	**0.273**	**<0.001**	**-1.060**	**0.383**	**0.006**
* frame H	0.240	0.467	0.607	-0.099	0.430	0.818	**-0.895**	**0.475**	**0.059**
* frame HE	-0.455	0.452	0.315	0.116	0.450	0.796	**-0.966**	**0.540**	**0.074**
Branded beverage	0.190	0.151	0.207	-0.008	0.122	0.948	-0.151	0.164	0.358
* frame H	-0.281	0.203	0.167	0.268	0.184	0.145	0.283	0.202	0.161
* frame HE	-0.024	0.194	0.902	-0.227	0.199	0.254	0.211	0.230	0.359
Price	**-0.853**	**0.289**	**0.003**	**-0.766**	**0.241**	**0.001**	-0.336	0.292	0.250
SD	*0.77*	*0.124*		*0.793*	*0.129*		*0.647*	*0.111*	
* frame H	0.207	0.373	0.579	0.059	0.336	0.861	-0.164	0.354	0.644
* frame HE	0.185	0.363	0.611	0.597	0.365	0.102	-0.294	0.407	0.470

Volume	**0.442**	**0.187**	**0.018**	**0.373**	**0.187**	**0.046**	**0.767**	**0.255**	**0.003**
* frame H	0.397	0.279	0.154	**0.826**	**0.326**	**0.011**	**-0.591**	**0.279**	**0.034**
* frame HE	0.389	0.272	0.153	-0.237	0.233	0.307	-0.114	0.344	0.740
Juice (no added sugar)									
ASC	-1.282	0.8479	0.13	**-1.561**	**0.735**	**0.034**	0.158	1.021	0.877
SD	*0.782*	*0.163*		*0.705*	*0.18*		*0.797*	*0.211*	
* frame H	0.730	1.176	0.535	-1.024	1.248	0.412	**-2.976**	**1.370**	**0.030**
* frame HE	0.315	1.143	0.783	0.656	1.295	0.613	-0.917	1.508	0.543
beverage type (a) [1]	**0.763**	**0.151**	**<0.001**	**1.145**	**0.158**	**<0.001**	**0.537**	**0.176**	**0.002**
* frame H	-0.212	0.204	0.299	0.230	0.250	0.357	0.267	0.236	0.258
* frame HE	0.335	0.210	0.111	**0.582**	**0.290**	**0.045**	0.180	0.259	0.486
Branded beverage	**-0.485**	**0.199**	**0.015**	**-1.185**	**0.210**	**<0.001**	**-0.532**	**0.259**	**0.040**
* frame H	-0.062	0.289	0.83	0.071	0.331	0.831	-0.192	0.339	0.572
* frame HE	-0.233	0.289	0.421	0.209	0.358	0.559	0.095	0.383	0.804
Price	-0.204	0.425	0.631	**-0.779**	**0.374**	**0.038**	**-1.184**	**0.537**	**0.027**
SD	*0.522*	*0.111*		*0.787*	*0.097*		*0.739*	*0.118*	
* frame H	-0.318	0.573	0.579	0.377	0.602	0.531	**1.271**	**0.679**	**0.061**
* frame HE	-0.644	0.561	0.251	-0.694	0.636	0.275	0.522	0.747	0.485
Volume	0.724	1.363	0.595	0.647	1.487	0.664	1.237	2.001	0.536
* frame H	-0.652	1.658	0.694	2.724	2.233	0.223	1.648	2.549	0.518
* frame HE	2.501	2.514	0.32	-1.679	2.195	0.444	0.489	2.879	0.865
Water									
ASC	**-1.183**	**0.420**	**0.005**	**-1.813**	**0.424**	**<0.001**	**-1.444**	**0.572**	**0.012**
SD	*0.825*	*0.118*		*0.741*	*0.142*		*0.857*	*0.138*	
frame H	-0.940	0.615	0.127	**1.562**	**0.574**	**0.007**	-0.314	0.738	0.671
* frame HE	-0.763	0.530	0.15	0.158	0.605	0.794	-0.143	0.763	0.852
beverage type (a) [1]	**0.573**	**0.141**	**<0.001**	**0.902**	**0.142**	**<0.001**	**0.983**	**0.222**	**<0.001**
* frame H	**-0.383**	**0.220**	**0.082**	-0.266	0.205	0.196	-0.099	0.286	0.729
* frame HE	0.103	0.186	0.579	0.282	0.234	0.229	0.246	0.305	0.420
Branded beverage	0.136	0.203	0.504	-0.066	0.198	0.738	0.386	0.301	0.200
* frame H	-0.407	0.315	0.195	-0.074	0.271	0.786	**-0.922**	**0.381**	**0.015**
* frame HE	-0.388	0.257	0.13	0.086	0.285	0.763	-0.410	0.379	0.279
Price	**-2.357**	**1.114**	**0.034**	**-4.659**	**1.474**	**0.002**	**-7.927**	**2.630**	**0.003**
SD	*2.614*	*0.547*		*4.973*	*0.894*		*5.419*	*1.26*	
* frame H	1.015	1.654	0.539	0.006	1.664	0.997	2.989	2.518	0.235
* frame HE	1.705	1.287	0.185	0.057	1.768	0.974	2.782	2.620	0.288
Volume	**2.347**	**0.511**	**<0.001**	**1.544**	**0.400**	**<0.001**	**1.380**	**0.638**	**0.030**
* frame H	-0.238	0.657	0.717	**-0.879**	**0.477**	**0.065**	-0.219	0.826	0.791
* frame HE	-0.756	0.573	0.187	-0.974	0.559	0.081	-0.165	0.778	0.831
LL	-3,125			-3,297			-2,489		
AIC	6,402			6,747			5,131		
n	2,496			2,724			2,016		

Notes: Alternatives are presented in columns for presentational purposes, the model was estimated including all the variables listed in each row for each of the alternative beverage groups. Categorical variables were effects coded; [1] beverage types were for SSBs: fizzy (a), juice drink (b), squash/cordial (excluded); for diet beverages:

fizzy (a), juice drink (b), squash/cordial(excluded); for juice: pure juice (a), smoothie (excluded); water: still (a), sparkling (excluded). Figures in bold indicate where coefficient was significant at least at 10% level. H- 'health' frame, HE – 'health and earmark' frame. Number of respondents 208, 227 and 168, in 'yes', 'no' and 'unsure' subsamples, respectively.