The Importance of Taste for Food Demand and the Experienced Taste Effect of Healthy Labels – An Experiment on Potato Chips and Bread

Thunström, Linda; Nordström, Jonas

2014

Working Paper 2014:13

Department of Economics
School of Economics and Management

The Importance of Taste for Food Demand and the Experienced Taste Effect of Healthy Labels – An Experiment on Potato Chips and Bread

Linda Thunström
Jonas Nordström

April 2014

LUND UNIVERSITY

The Importance of Taste for Food Demand and the Experienced Taste Effect of Healthy Labels – An experiment on potato chips and bread

Linda Thunström[*] and Jonas Nordström[**]

23 April 2014

Abstract

This paper quantitatively analyzes the importance of taste versus health in food demand, as well as the effect on consumers' experienced taste of the non-intrinsic value of healthy labels. Our analysis is based on taste experiments and Vickrey second price auctions on potato chips and bread. Our findings imply a large positive effect on demand for potato chips from higher taste scores: when consumers' experienced taste from potato chips improves by one unit, the average willingness-to-pay (WTP) for a 150 gram bag of chips increases by 25 euro cents. The estimated effect from taste on bread demand is smaller, but may be sizeable for subgroups of consumers. Our evidence suggests that demand for chips and bread is unaffected by nutrition – the effect of the healthy label on WTP is not statistically significant. Finally, we find that consumers' experienced taste of a food is unaffected by the food carrying a healthy label.

Keywords: willingness-to-pay for food, revealed preferences, taste, non-intrinsic value, healthy label

JEL-codes: D12, D83, Q18

[*] Department of Economics and Finance, University of Wyoming, 1000 E. University Ave. Laramie, WY 82071 and HUI Research AB, 103 29 Stockholm, Sweden, e-mail: lthunstr@uwyo.edu

[**] Department of Economics, Lund University, Box 117, 221 00 Lund, Sweden, e-mail: jonas.nordstrom@nek.lu.se

Financial support is gratefully acknowledged from the Swedish Retail and Wholesale Development Council.

1. Introduction

The prevalence of diet related illnesses, such as cardiovascular disease, diabetes, several types of cancer, as well as the conditions of overweight and obesity, has become one of the most important public health issues throughout the Western world and many transition economies. Public and private institutions are therefore making efforts to promote healthy eating, e.g., via information campaigns, food labeling and tax reforms.

In promoting healthy food choices, a major challenge is the trade-off between taste and nutrition. The nutritional content is generally found to be second to taste in determining consumer food choices. When asking consumers, taste is typically stated to be the most, or amongst the most, important determinants of food choice (Lennernas et al., 1997; Glanz et al., 1998). Taste, in turn, is enhanced by ingredients that are over consumed by most consumers – sweeteners, salt and fat (Drewnowski, 1997a,b). Consumers may even have expectations that unhealthy food (i.e. food high in fat, sweeteners and salt) tastes better: Raghunathan et al. (2006) show that consumers' experienced taste pleasantness of food is higher for food *portrayed* as unhealthy, compared to the exact same food when it is not portrayed as unhealthy.

Stated preferences often differ from revealed preferences (where the latter is generally used as a measure of consumers' true preferences), however, and, to our knowledge, there are no previous studies analyzing the revealed importance of taste over nutrition in food, or quantifying the importance of taste and nutrition in food demand. Further, there are no previous studies analyzing the impact on food demand of the non-intrinsic value of healthy labels commonly used by food producers (i.e. labels indicating that food is healthier than its alternatives).[1] If taste is found to dominate nutrition, and people experience lower taste for food that carries healthy

[1] This differs from Raghunathan et al. (2006) who analyzed if consumers' experienced taste was affected by the food being portrayed as *unhealthier* than its substitutes. Our study is also related to two recent studies by Norton et a. (2013) and Wan-chen et al. (2013), although our study differs in important dimensions from theirs. Norton et al. examine the impact on product "liking" (i.e. a measure likely to be composed by both consumer perceptions of health and taste) from labelling a chocolate as lower in fat. Wan-chen et al. analyze the impact on taste perception, and perceived healthiness of an organic label, and found that consumers often perceive organic products as healthier, but not necessarily tastier. Both Norton et al. and Wan-chen et al. also collect measures of WTP for the products. However, in both studies, the price measure is stated (i.e. not revealed), and product characteristics, such as health and taste, as determinants of the price are not examined

labels, labeling food as particularly healthy may have unintended negative effects on food demand, i.e. it may even discourage people from buying the healthy food.[2]

The purpose of this paper is to address these research gaps. First, we aim to quantitatively analyze the revealed importance of taste for willingness-to-pay (WTP) for food, relative to nutrition. Second, we analyze if the non-intrinsic value of healthy labels affects consumers' experienced taste from food.

Our analysis is based on experiments entailing potato chips and bread. Subjects' demand, as measured by WTP, for potato chips and bread is extracted via experimental Vickrey second price auctions (Vickrey, 1961; Shogren et al., 2001), and the impact of healthy labels on subjects' experienced taste from food is extracted via taste experiments, where the healthier alternative appears twice; once labeled and once without the label. Our results imply that food demand is strongly determined by peoples' taste experience of food. We further explore the idea that the importance of taste may differ over consumer groups, and our evidence suggests that taste is especially important in determining demand for normal weight subjects. For bread, taste also seems more important to subjects who classify their overall food intake as unhealthy/less healthy and have a higher level of education. We do not find a statistically significant impact of nutrition (represented by healthy labels) on food demand, for any consumer group. Our results also imply that consumer's experienced taste from food is unaffected by the non-intrinsic value provided by a healthy label.

The paper is structured as follows. Section 2 describes the data and experimental design, section 3 provides the results and section 4 provides a final discussion of the findings.

[2] Utility from a product is generally assumed to only depend on the product's intrinsic characteristics and preferences of the consumer: taste should only depend on the ingredients in a food product and the individual characteristics and preferences of the person eating the food. However, other studies show that non-intrinsic attributes of a good (price, brand, etc) can affect reported or experienced taste (e.g. Plassman, 2008; Robinson et al., 2007; Lee et al., 2006; Allison, 1964). For instance, Plassman et al. (2008) find that consumers' experienced taste pleasantness of wine increases with the stated price of the wine, regardless of the actual quality or market price of the wine. Their results were confirmed both by stated pleasantness and measuring brain activities by a functional MRI.

2. Data and experimental design

A market research company recruited 63 subjects from the Stockholm area, of different ages, education, income and gender. Subjects were offered a general gift card SEK 100 to participate in the taste experiment and Vickrey second price auction. The study was estimated to take between 15-20 minutes of subjects' time.

The subjects were asked a number of background questions (see the survey questions in Appendix B). For instance, subjects were asked to classify their food intake as "not healthy", "less healthy", "healthy" or "very healthy", and their weight (underweight, normal- or overweight). We created a dummy variable for subjects that classified their food intake as not healthy or less healthy (not healthy or less healthy=1; healthy or very healthy=0) and a dummy variable for subjects that assessed themselves as underweight or normal weight (under or normal weight=1; overweight= 0).[3] We also created a dummy variable for low income earners (low income earner=1; higher income group=0). The average taxable labor income in Sweden 2010 was EUR 27,259/year (SEK 241,000/year[4]) for those 20-64 years of age (Statistics Sweden, 2012). We define those with an income of EUR 27,259/year or less as low-income earners. For a detailed summary of subject characteristics, see Table 1 below. In our empirical analysis, we use the variables in Table 1, but suppress the level of detail of the subject characteristics, see Table 2.

The taste experiments for potato chips and bread were designed as follows. Subjects were brought into a room in groups of 15-20 subjects at the time. The subjects were asked to rate the taste of five different potato chips alternatives on a scale from 1 ("very poor") to 5 ("very good"). The chips alternatives were presented on several tables in the room, in equal white cups, labeled A, B, C, D and E, where alternative B was labeled "low fat, 7.5%". Each participant was assigned a seat at one of the tables and the order of the cups (A-E) on the tables across the room was varied. The chips alternatives they were asked to rate were all of the flavor sour cream and onion. Unknown to the subjects, alternative B and D were actually the same potato chips

[3] Note that the variables on body weight and healthy eating are subjects' perceptions of themselves and their behavior, i.e. they may deviate from their actual eating habits and body weight. Studies show, for instance, that women often overestimate their actual bodyweight, whereas men often underestimate their bodyweight (Brug et al., 2006; Kamel and McNeill, 2000). Behavior is, however, likely to be guided by perceptions, rather than actual eating habits and body weights.

[4] On 17th of March 2014, the exchange rate EUR/SEK=8.841.

alternative (i.e. the low fat alternative), but it was only labeled as low fat when it appeared as alternative B.

Table 1 – Subject characteristics

Characteristic	Percent of subjects who answered the question	No of obs
Female	48.4	62
Perceived healthiness of diet		
Unhealthy	1.6	61
Less healthy	24.6	61
Healthy	67.2	61
Very healthy	6.6	61
Perceived body weight		
Underweight	4.9	61
Normal weight	63.9	61
Overweight	31.1	61
Income		
Annual income < average	34.9	60
Highest level of education		
High school	21.7	60
College/university	56.7	60
Other post high school education	21.6	60
Age	41 years (both average and median)	59

Table 2 – Subject characteristics in the empirical analysis

Variable	Mean	Std. Dev.	Min	Max	No of obs
Female	0.484	0.504	0	1	62
Unhealthy diet	0.254	0.439	0	1	63
Normal (or under) weight	0.689	0.467	0	1	61
Over weight	0.311	0.467	0	1	61
Low income	0.349	0.481	0	1	63
Age	41.339	10.929	22	60	59

For bread, the taste experiment was designed correspondingly, although here subjects had four alternatives they were asked to rate and alternative B was labeled with a healthy label - the Nordic Keyhole. The Nordic Keyhole is a label certified to particularly healthy food alternatives by the Swedish National Food Administration (SLV), and is widely recognized by the general public. The criteria for certification vary over food products, and for bread to be certified with the Keyhole, it needs to contain moderate amounts of sugar, salt and fat, while being high in fiber. Unknown to subjects, alternative B and D were the same (i.e. the healthy labeled, i.e., Keyhole labeled, alternative), although only alternative B was labeled. The bread was cut into pieces of similar sizes for all bread types and placed in white cups labeled A, B, C, D, where the order of appearance of the cups was varied across tables and participants.

After having rated the taste of the different potato chips and bread alternatives, the WTP for each potato chips and bread product was extracted using a Vickrey second price auctions. Participants were asked to place sealed bids (in SEK) on a 150 gram bag of each type of chips and a 200 gram bag of each type of bread. The participant with the highest bid would win the auction, paying the second highest bid for the good. However, only one type of potato chips and one type of bread would be auctioned off; there would be a random draw of which chips and which bread alternative that would be auctioned off. Subjects were informed that, if they won the auction, their stated WTP would be subtracted from their compensation for participating in the experiment.

3. Results

The results from the taste experiment are reported in table 3 below. The average *taste scores* for all potato chips alternatives range from 3.158 (alternative E) to 3.429 (the low-fat labeled chips), and the average taste scores for all bread alternatives range from 2.758 (the unlabelled healthy alternative) to 3.242 (alternative A). In table 3, potato chips (bread) B and D are the same type of potato chips (bread), where it is labeled as low fat (with a healthy label – “Keyhole”) when presented as alternative B, while unlabelled when presented as alternative D. As shown by table 2, the average taste scores of potato chips B and D are 3.429 and 3.174, whereas the average taste scores of bread B and D are 2.823 and 2.758.

Table 3 – Taste scores for potato chips and bread

Variable	Mean	Std. Dev.	Min	Max	No of obs
Potato chips (sour cream and onion)					
Type A	3.477	1.014	1	5	63
Type B (low fat, labeled)	3.429	1.043	1	5	63
Type C	3.270	1.003	1	5	63
Type D (low fat, unlabeled)	3.174	1.185	1	5	63
Type E	3.159	1.125	1	5	63
Bread (flatbread)					
Type A	3.242	0.987	1	5	62
Type B (Keyhole, labeled)	2.823	1.017	1	5	62
Type C	3.032	0.829	2	5	62
Type D (Keyhole, unlabeled)	2.758	0.900	1	5	62

We test the hypothesis that the population mean taste scores of potato chips B and D (and, correspondingly, the mean taste scores of bread B and D) are the same using the non-parametric Wilcoxon signed-rank test, accounting for the facts that the variables are not normally distributed and that observations are not independent of one another. The result from the Wilcoxon signed-rank tests suggest that we cannot reject the hypotheses that the average taste scores are the same (p-value=0.1559 for chips and p-value= 0.4506 for bread). We find no support for the idea that the non-intrinsic value of healthy labels affects consumers' experienced taste of potato chips and bread.

Further, we analyzed if there persists prejudice of the taste of healthy labeled products within subgroups of the sample. We did so by performing non-parametric Wilcoxon Mann Whitney tests on the average difference in taste scores between the labeled and unlabelled alternatives over these respective groups (the null being that the mean scores are the same for the respective subgroups): (a) both gender groups, (b) overweight subjects and non-overweight subjects, (c) low-income subjects and subjects of higher income, (d) university educated subjects and subjects with a lower education level, as well as for (e) subjects that believed they had a healthy diet, relative to subjects who believed their diet was generally of poor quality. In none of the cases can we reject the null hypothesis (at the 10 percent level) that the experienced taste difference

between the labeled and unlabelled healthy is unaffected by gender, body weight, income, education level or a generally healthy diet.

Table 4 – Willingness-to-pay (WTP) in SEK for potato chips (150 grams) and bread (200 grams)

Variable	Mean	Std. Dev.	Min	Max	No of obs
Potato chips (sour cream and onion)					
Type A	9.777	7.811	0	30	63
Type B (low fat, labeled)	10.071	7.216	0	30	63
Type C	9.445	7.228	0	30	63
Type D (low fat, unlabeled)	8.874	7.127	0	25	63
Type E	9.254	7.053	0	20	63
Bread (flatbread)					
Type A	10.881	7.905	0	27	63
Type B (Keyhole, labeled)	10.428	7.748	0	25	63
Type C	10.185	7.441	0	25	63
Type D (Keyhole, unlabeled)	9.280	7.647	0	25	63

The results from the Vickery auction are presented in table 4. The WTP for 150 grams of potato chips ranges from SEK 8.874 (EUR 0.976) for the unlabelled low fat alternative D to SEK 10.071 (EUR 1.108) for the low fat labeled alternative D. For bread, the WTP ranges from SEK 9.280 (EUR 1.021) for the unlabelled Keyhole alternative D to SEK 10.881 (EUR 1.197) for the labeled Keyhole alternative B. Interestingly, for both chips and bread, the *unlabelled* healthy alternative yields the *lowest* willingness to pay of all potato chips respectively bread alternatives, while the *healthy labeled* alternatives yield the *highest* willingness to pay. A Wilcoxon signed-rank test was performed to analyze if the WTP is the same for low fat potato chips, if it is labeled as low fat (chips B) versus when it is unlabelled (chips D). Again, a corresponding Wilcoxon signed-rank test was performed for bread (bread B versus bread D). Here, we can reject the null hypothesis (at the 10 percent level) that the mean WTP is the same for alternative B and D for potato chips (p-value=0.0052) and bread (p-value=0.0651). I.e. when we do not control for taste, the tests suggest that the healthy label increases product demand, as indicated by a significantly higher WTP for healthy labeled products.

To control for both the impact of taste and the healthy label on the WTP, we estimate Tobit regression models for bread respectively potato chips. The regression results are presented in Tables 5 and 6. The dependent variable is WTP while the explanatory variables included in the model are taste score and dummy variables representing the different potato chips (bread) alternatives, where the reference alternative is the healthy labeled alternative. To explore if subgroups of consumers may differ in the importance they attach to taste in food demand, we also include interaction terms between the taste score and the background variables specified in Table 2, i.e. female, normal weight, eating healthy, low income and age.[5]

Table 5 – Tobit regression results for potato chips

Variable	coefficient	s.e.	*t*-value	*p*-value
Dependent variable: WTP				
Constant	-0.646	1.851	-0.35	0.727
Taste score	2.234***	0.545	4.10	0.000
Type A	-0.487	1.464	-0.33	0.740
Type C	-0.049	1.465	-0.03	0.973
Type D (low fat, unlabeled)	-0.702	1.472	-0.48	0.634
Type E	-0.048	1.471	-0.03	0.974
Taste score * female	-0.011	0.307	-0.04	0.971
Taste score * normal weight	0.662**	0.297	2.23	0.026
Taste score * unhealthy diet	0.328	0.325	1.01	0.314
Taste score * low income	0.471	0.295	1.60	0.111
Taste score * university	-0.017	0.288	-0.06	0.953

Note: No of obs: 310, Prob > Chi2 = 0.0000, Pseudo R2 = 0.0250, *> 0.90 statistical significance, **>0.95 statistical significance, and ***>0.99 statistical significance

[5] Generally, the bivariate correlation between the explanatory variables is low (0.3 and below). However, the correlation between taste and the interaction variable of taste and age constitute an exception – the bilateral correlation between these variables (as well as between their coefficients) is around 0.8 in absolute value in both the chips and the bread regression models. If we include the interaction variable between taste and age in the chips regression model, we impose a problem of multicollinearity, as manifested by that both the taste variable and the interaction variable lose their statistical significance, even though they individually are both highly statistically and economically significant. We therefore choose not to include the interaction variables between state and age in the regression model for chips. For bread, neither taste nor the interaction variable between taste and age are individually significant. Further, the coefficients of these variables are of the same sign, regardless if they both are included in the regression model for bread or not, and including the interaction variable between taste and age in the regression model seems to add to the explanatory power of the model. We therefore include the highly correlated variables in the regression model for bread.

Table 6 – Tobit regression results for bread

Variable	coefficient	s.e.	*t*-value	*p*-value
Dependent variable: WTP				
Constant	2.433	2.165	1.12	0.262
Taste score	1.221	1.197	1.02	0.309
Type A	-0.365	1.667	-0.22	0.827
Type C	-0.812	1.656	-0.49	0.624
Type D (Keyhole, unlabeled)	-1.521	1.661	-0.92	0.361
Taste score * age	-0.017	0.018	-0.94	0.351
Taste score * female	-0.127	0.408	-0.31	0.755
Taste score * normal weight	2.130***	0.444	4.80	0.000
Taste score * unhealthy diet	1.124**	0.490	2.29	0.023
Taste score * low income	-0.656	0.415	-1.58	0.116
Taste score * university	0.750*	0.402	1.87	0.063

Note: No of obs: 232, Prob > Chi2 = 0.0000, Pseudo R2 = 0.0331, *> 0.90 statistical significance, **>0.95 statistical significance, and ***>0.99 statistical significance

As shown by table 5, taste has a strong and statistically significant (at the 1 percent level) effect on the WTP for potato chips. In general, if the taste score increases by 1 unit, the average WTP for a 150 gram bag of chips increases by SEK 2.23 (EUR 0.252). Table 6 shows that for bread, the effect of taste on WTP is also quite large; if the taste score increases by 1 unit, the average WTP for a 200 gram bag of bread increases by SEK 1.22 (EUR 0.138), but this result is not statistically significant.

All dummy variable coefficients are negative, both for potato chips and bread, but these results are not statistically significant. [6] Hence, we cannot reject the null hypothesis that the healthy label has no impact on the WTP for chips and bread, implying that taste is dominant over nutrition in determining demand for chips and bread.[7]

[6] We estimated alternative models, including interaction terms between the dummy representing the unlabelled healthy alternative and gender, income, education level, overweight and healthy diet. None of these were statistically significant, i.e. the WTP for the health labeled alternative, relative to the same (unlabelled) alternative, is not affected by these individual characteristics.

[7] Note that a direct comparison of the impact on demand from the subjective measure of taste and the objective measure of a healthy label may not be entirely uncontroversial, both since the variables differ in that one is subjective (taste), the other objective (the label), and they are measured on different scales (taste ranges from 1-5, while the dummy variable indicating the label takes the values 0 or 1). However, it is reasonable to believe that the

We explore the possibility that the importance of food demand differs over consumer groups. Taste seems to be more important to food demand for normal (and under) weight subjects than it is to overweight subjects. The interaction term between the taste score and normal weight has a large and statistically significant effect on the WTP for both chips and bread; being normal weight increases the positive impact on WTP from a one unit change in the taste score by SEK 0.66 (EUR 0.075) for potato chips (*p*-value = 0.026) and SEK 2.13 (EUR 0.241) for bread (*p*-value = 0.000). The interaction term between the taste score and an unhealthy diet has a strong and statistically significant effect on the WTP for bread, as does the interaction term with higher education. These interaction terms have no statistically significant effect on the WTP for potato chips, though. For instance, our results suggest that the increase in WTP for bread from a units increase in the taste score is SEK 1.11 (EUR 0.126) higher for subjects who characterize their diet as less healthy/unhealthy, compared to if the diet is characterized as healthy/very healthy (*p*-value = 0.023). Although speculative, this result may imply that an unhealthy diet is partly driven by a stronger preference for taste in food.

4. Discussion

In this paper we use taste experiments and Vickrey second price auctions entailing potato chips and bread to quantify the relevance of taste, over nutrition, for food demand. Further, we analyze if the non-intrinsic value of healthy labels (a low-fat label and the Nordic Keyhole label) negatively affects consumer's experienced taste, thereby potentially contributing to the weak impact of nutrition on food demand.

Or findings imply that the effect of taste on food demand is strong and highly statistically significant. Subjects in the analysis were asked to rate the taste of both potato chips and bread on a scale from 1-5 (where 5 is the highest score), and the results suggest that as the taste score increases by one unit, WTP increases by more than 25 euro cents per 150 gram of potato chips, and by 14 euro cents per 200 grams of bread, for the average consumer. However, this effect is

---

healthy label weighs heavily in forming consumer nutrition beliefs in food, due to the non-transparency of nutrition. Taste, on the other hand, is fully transparent to the consumer, once the product has been tasted. Further, our conclusions are supported by the result (see below) that the healthy label has no significant impact on the value our subjects attach to chips or bread, whereas taste does have a significant impact.

not statistically significant for bread, but exploratory evidence suggests that some groups of consumers may attach a higher value to taste in bread. Our results also suggest that normal weight subjects attach a higher weight to taste in both bread and chips. More specifically, if the taste score increases by one unit, our results imply that normal weight subjects increase their WTP for bread by more than 24 euro cents per 200 gram bread, compared to overweight subjects, while a one unit increase in the taste score for chips causes normal weight subjects to increase their WTP for chips by 7 euro cents more than overweight subjects. We find no statistically significant impact of the healthy label on WTP for chips or bread. We therefore conclude that taste seems to be a significantly more important determinant of food demand than is nutrition.

Given the importance of taste on WTP for food, demand for healthy food could be negatively affected if consumers *believe* that healthy labeled food is less tasty than other food, which would cause an unintended negative impact on food demand from labeling. However, in our taste experiment on potato chips and bread we find no negative impact on experienced taste from the healthy label.

Taste is generally enhanced by unhealthy ingredients, such as sugar, fat and salt. Our results may therefore imply that the unhealthier the food, relative to its' substitutes, the higher the demand. If aiming to strengthen demand for healthy food, it is therefore crucial to ensure that healthy food is no less tasty than unhealthy food. Also, it is not clear that consumers are willing to pay more for healthy labeled food. Therefore, it is also important to ensure that the cost of healthy food is no higher than that of unhealthier food substitutes.

Finally, even though taste is the number one determinant in food demand, our results suggest that producers need not fear adding a healthy label to their products: we find that consumers do not have prejudice that healthy labeled food tastes worse than its substitutes. This result may appear to differ from previous research by Raghunathan et al. (2006) who found that food communicated to be particularly *unhealthy* yield a higher experienced taste, while our results imply no impact on consumers' experienced taste from communicating that the food is *healthier* (via food labels). The difference in results between theirs and this study could be due to a framing effect -- labeling healthy versus unhealthy food. Such a framing effect has for instance been found by Levin and Gaeth (1988), who found that beef portrayed as 25% fat was expected to taste worse than beef that was portrayed as 75% lean. Also, samples and methods differ

between our study and Raghunathan et al. (2006), as well as products: they perform experiments entailing snack crackers and Mango Lassi (an East Indian “milk shake”).

This is the first study to quantify the effects of taste relative to health (as represented by a healthy label) on food demand, and more extensive research on this topic is needed. Our sample is small and our results are likely to be affected by the products used in the experiments in this study. For instance, respondents may regard low-fat potato chips as no healthier than its high fat substitutes, meaning that a low fat label may have a smaller effect on demand for potato chips than it would have for other products. The differences we find over consumer subgroups (e.g., normal weight versus over weight subjects, and low income earners versus other income groups) in the importance of taste for food demand are also worth further exploring. Further, the potential framing effect underlying the difference in results between this study and previous research on consumer’s experienced taste from unhealthy food deserves attention from future research.

References

Allison, R.I., Uhl, K.P. (1964) “Influence of beer brand identification on taste perception,” *Journal of Marketing Research*, 1(3): 36-39

Brug, J., Wammes, B., Kremers, S., Giskes, K. and Oenema, A. (2006) “Underestimation and overestimation of personal weight status: associations with socio-demographic characteristics and weight maintenance intentions,” *Journal of Human Nutrition and Dietetics*, 19(4): 253-262

Drewnowski A. (1997a) “Taste preferences and food intake”, *Annual Review of Nutrition*, 17:237–253

Drewnowski A. (1997b) “Why do we like fat?,” *Journal of the American Dietetic Association*, 97(Suppl 7):S58–S62

Glanz K., Basil M., Maibach E., Goldberg J., and Snyder D. (1998) “Why Americans eat what they do: taste, nutrition, cost, convenience, and weight control concerns as influences on food consumption,” *Journal of the American Dietetic Association*, 98(10): 1118–1126.

Kamel, E.G. and McNeill, G. (2000) “Men are less aware of being overweight than women,” *Obesity research*, 8(8): 604

Lee, L., Frederick S., and Ariely, D. (2006) “Try it, you’ll like it: The influence of expectation, consumption, and revelation on preferences for beer,” *Psychological Science*, 17(12):1054–1058.

Lennernäs, M., Fjellström, C., Becker, W., Giachetti, I., Schmitt, A., Remaut de Winter, A., and Kearney, M. (1997) “Influences on food choice perceived to be important by nationally-representative samples of adults in the European Union,” *European Journal of Clinical Nutrition*, 51(Suppl 2):S8-15

Levin, I. P. and Gaeth, G.J. (1988), “How consumers are affected by the framing of attribute information before and after consuming the product,” *Journal of Consumer Research*, 15(3): 374–78.

Norton, J.E., Fryer, P.J. and Parkinson, J.A. (2013) “The effect of reduced-fat labelling on chocolate expectations,” *Food and Quality Preference*, 28(1): 101-105

Raghunathan, R., Walker Naylor, R. and Hoyer, W.D. (2006) “The unhealthy= tasty intuition and its effects on taste inferences, enjoyment, and choice of food products,” *Journal of Marketing*, 70(4): 170-184

Robinson, T.N., Borzekowski, D.L.G, Matheson, D.M. and Kraemer, H.C. (2007) “Effects of fast food branding on young children’s taste preferences, archives of pediatrics and adolescent medicin,” *Archives of Pediatrics and Adolescent Medicine*, 161(8): 792-797

Shogren, J.F., Cho, S., Koo, C., List, J., Park, C., Polo, P., Wilhelmi, R. (2001) “Auction mechanisms and the measurement of WTP and WTA,” *Resource and Energy Economics*, 23(2): 97-109

Wan-chen, J.L., Shimizu, M., Kniffin, K.M. and Wansink, B. (2013) “You taste what you see: Do organic labels bias taste perceptions?,” *Food Quality and Preference*, 29(1): 33-39

Vickrey, W. (1961) “Counterspeculation, auctions and competitive sealed tenders,” *Journal of Finance*, 16(1): 8-37

Appendix A Figures

Figure 1: Taste scores for chips

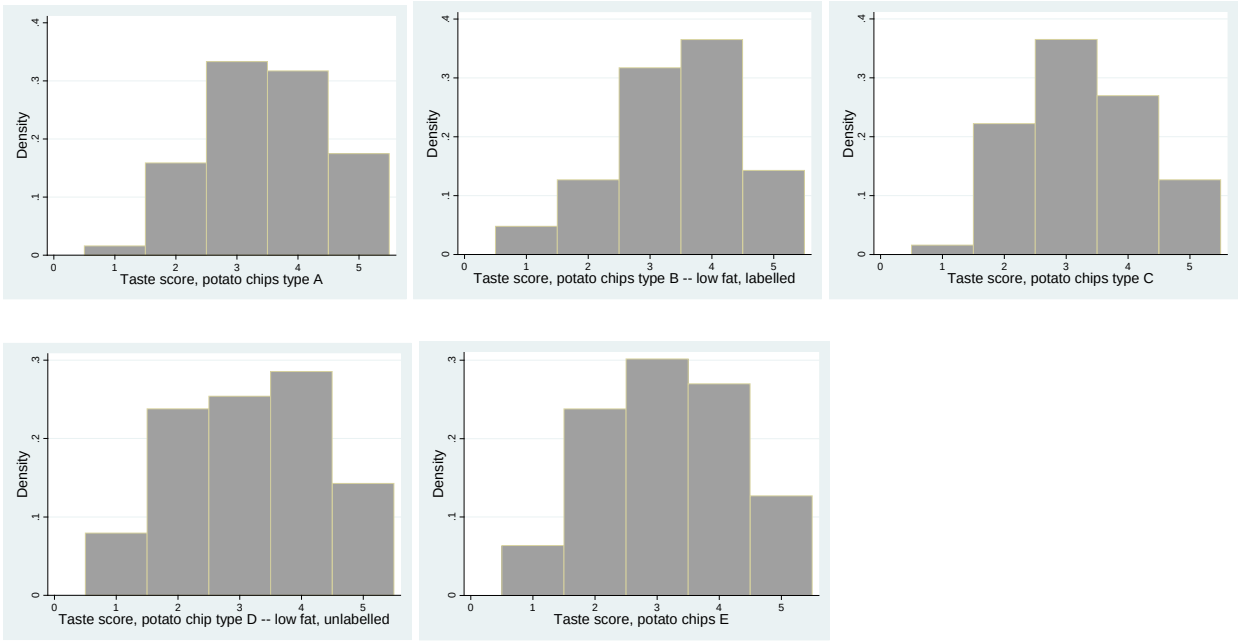


Figure 2: Taste scores for bread

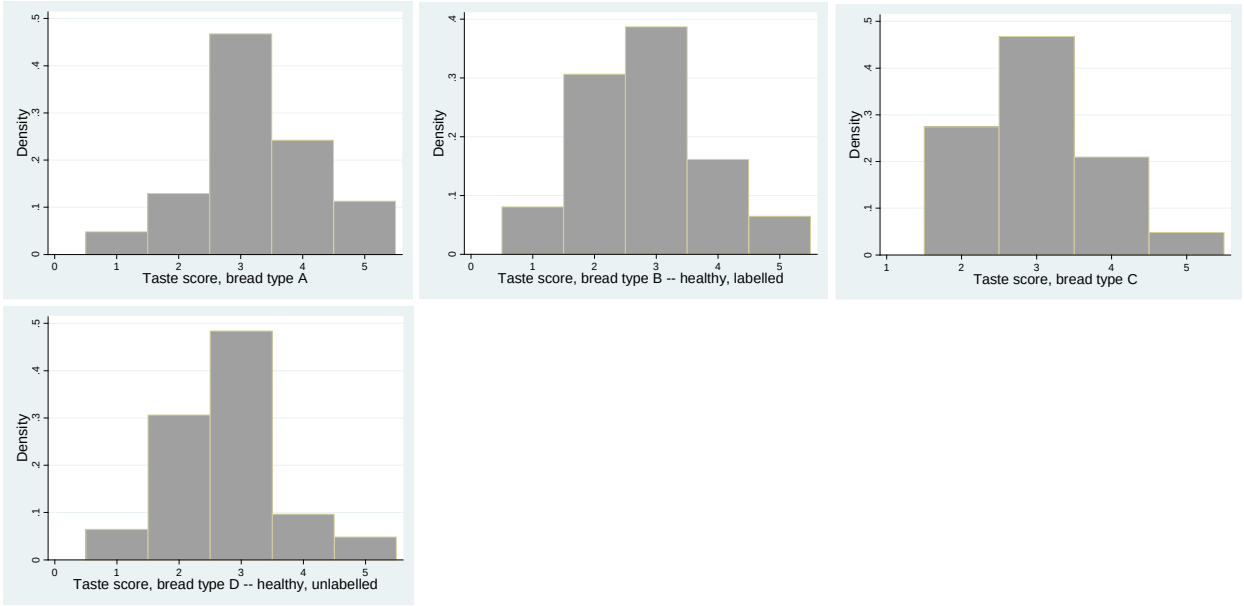


Figure 3: Willingness-to-pay (WTP) for potato chips, in SEK

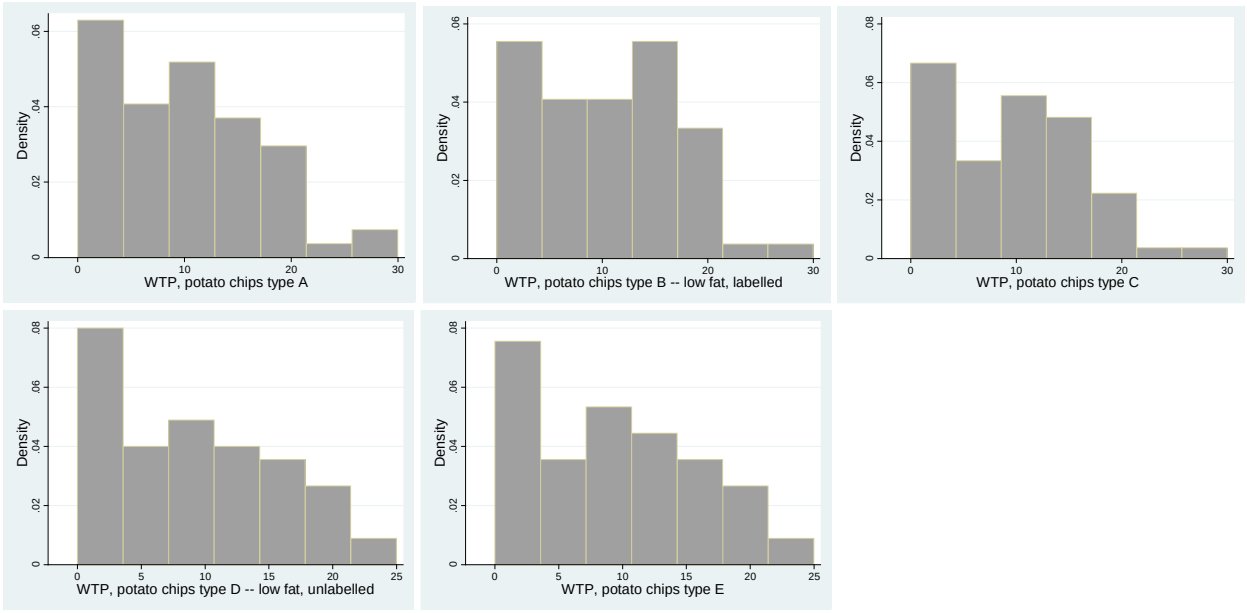
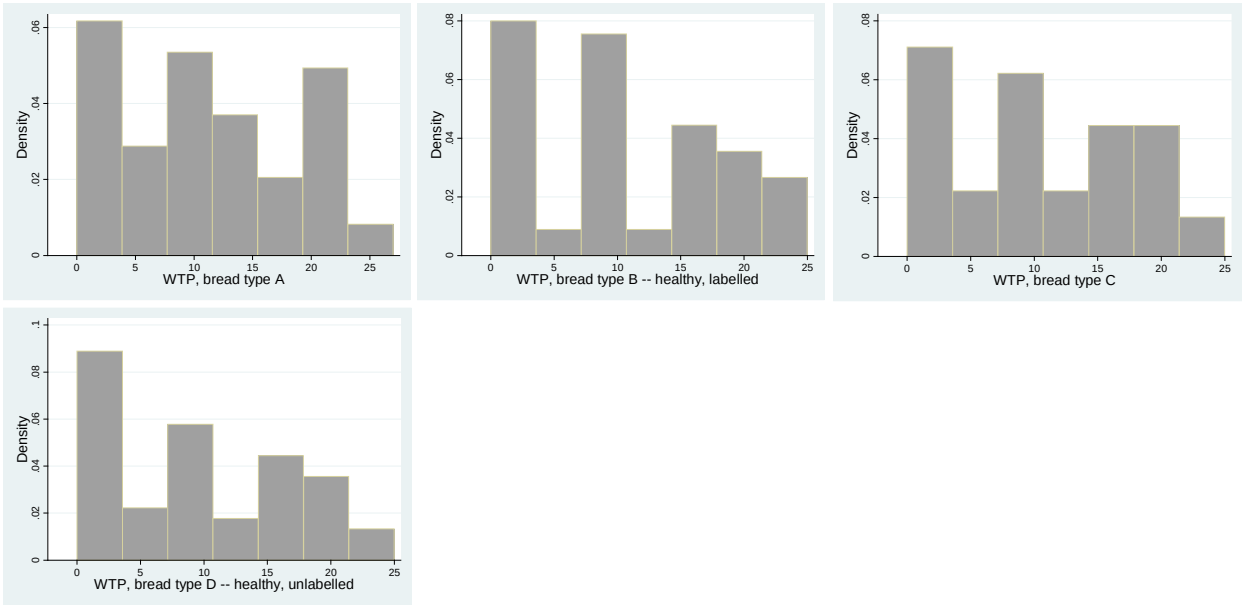


Figure 4: Willingness-to-pay (WTP) for bread, in SEK



Appendix B **Background questions**

Please state age and gender for you and your family members

	Year of bith	Gender
You	_____	❑ Female ❑ Male
Your spouse	_____	❑ Female ❑ Male
Oldest child	_____	❑ Female ❑ Male
Second oldest child	_____	❑ Female ❑ Male
Third oldest child	_____	❑ Female ❑ Male
Forth oldest child	_____	❑ Female ❑ Male
Fifth oldest child	_____	❑ Female ❑ Male

What is your highest level of education?

(1) ❑ Elementary school (9 years)

(2) ❑ High school

(3) ❑ Folkhögskola [Swedish type of vocational training]

(4) ❑ University 1-2 years

(5) ❑ University 3-5 years

(6) ❑ Other post-high school education

(7) ❑ Graduate school

(8) ❑ Other education

(9) ❑ No education

(10) ❑ I do not know

What is your monthly salary (pre-tax)?

(1) ❑ Less than SEK 10 000

(2) ❑ SEK 10 001 – 20 000

(4) ❑ SEK 20 001 – 30 000

(5) ❑ SEK 30 001 – 40 000

(6) ❑ SEK 40 001 – 50 000

(7) ❑ SEK 50 001 – 60 000

(8) ❑ SEK 60 001 – 80 000

(9) ❑ SEK 80 000 – 100 000

(10) ❑ SEK 100 001 – 150 000

(11) ❑ more than SEK 150 000

(12) ❑ I do not know

How would you describe your total food intake during the day?

(1) ❑ Unhealthy

(2) ❑ Less healthy

(3) ❑ Healthy

(4) ❑ Very healthy

(5) ❑ I do not know

How would you describe your body weight?

(1) ❑ Underweight

(2) ❑ Normal weight

(3) ❑ Overweight

(4) ❑ I do not know