



AgEcon SEARCH
RESEARCH IN AGRICULTURAL & APPLIED ECONOMICS

The World's Largest Open Access Agricultural & Applied Economics Digital Library

This document is discoverable and free to researchers across the globe due to the work of AgEcon Search.

Help ensure our sustainability.

Give to AgEcon Search

AgEcon Search

<http://ageconsearch.umn.edu>

aesearch@umn.edu

*Papers downloaded from **AgEcon Search** may be used for non-commercial purposes and personal study only. No other use, including posting to another Internet site, is permitted without permission from the copyright owner (not AgEcon Search), or as allowed under the provisions of Fair Use, U.S. Copyright Act, Title 17 U.S.C.*

Calorie labeling and fast food choices in surveys and actual markets: some new behavioral results

Maria L. Loureiro and Djamal Rahmani

Selected Paper prepared for presentation at the Agricultural & Applied Economics Association's

2013 AAEA & CAES Joint Annual Meeting, Washington, DC, August 4-6, 2013.

Copyright 2013 by Loureiro and Rahmani. All rights reserved. Readers may make verbatim copies of this document for non-commercial purposes by any means, provided that this copyright notice appears on all such copies.

Calorie labeling and fast food choices in surveys and actual markets: some new behavioral results

Abstract

We conducted a survey and a randomized natural experiment with the same subjects to investigate the effect of information about calorie intake on fast food choices. This combined approach allows us to maximize both internal and external research validity and test consistency of findings. We find that providing information about calories in a survey context for fast food menus has a moderate effect on calorie consumption, decreasing on average by 2.96 percent the amount of calories of the selected food choices. However, the same nutritional information had no significant impact on actual purchases in the restaurant context. Among the possible menus, the salad menu (the healthiest menu) was the most preferred option by those respondents who received nutritional information in the survey context; whereas in the restaurant, the most popular choice for the same group of people was the “Double bacon burger option” (the least healthy option). Finally, we find that the average calorie content of participants’ actual purchases increases significantly (0.17%) with the number of days elapsed between the day when the survey took place (and information was provided) and the actual purchase day at the restaurant. These results show large discrepancies between stated preferences and actual market behavior. These findings may be justified by the existence of projection bias and subjects acting under rational ignorance.

Key words: actual market behavior, labeling, stated preferences, self-control, projection bias, rational ignorance

Classifications: 3C, 9I

Introduction

In 2008, the World Health Organization (WHO) indicated that 35% of adults aged 20+ were overweight (BMI ≥ 25 kg/m²) (34% men and 35% of women). This worldwide prevalence of obesity has more than doubled between 1980 and 2008. In 2008, 10% of men and 14% of women in the world were obese (BMI ≥ 30 kg/m²), compared with 5% for men and 8% for women in 1980. An estimated 205 million men and 297 million women over the age of 20 were obese – a total of more than half a billion adults worldwide (WHO, 2008).

Obesity has become a major public health problem because its genesis and treatment are two very complex phenomena. Obesity is the consequence of a long-term caloric imbalance between energy intake and energy expenditure, which results from a varied and complex set of genetic, metabolic, behavioral and psychological factors (United State Department of Health and Human Services, 2001).

Eating away from home has a significant impact on obesity rates (Anderson and Matsa, 2010; Chou et al., 2004; Currie et al., 2010; French et al., 2001). In this context, fast-food restaurants – an important segment in eating away from home - have been regulated and even fined for encouraging an obesogenic eating culture, especially among adolescents.

Success in reducing obesity trends would benefit from policies aimed at improving consumer food choices. Calorie labeling on chain restaurant menu boards is a public health policy that has been proposed to help consumers make better food choices at restaurants. Recently, numerous U.S states enacted legislation which requires restaurant chains to list the total calories of items on their menus. The law is mandated nationally by the Patient Protection and Affordable Care Act and was adopted by the federal

government in March 2010. On the contrary, in the European Union there are still no laws requiring nutritional information in restaurants. Although some chain restaurants provide nutritional information of menu items through brochures or on corporate websites (on a voluntary basis), displaying nutritional information is not required on menus in restaurants. Currently, nutritional information is not displayed on the food board, but rather on the reverse of the paper sheet placed on top of the food tray. The present study estimates the effects of calorie information on food choices provided in a survey context and in a restaurant setting in a fast food establishment.

Choices made in restaurants may be even less responsive to informational interventions. Fast food consumers tend to be in a hurry, and consequently, they may be more short sighted and less motivated to process nutritional information (Wisdom et al., 2010). This lack of responsiveness may be even more serious in the case where fast food shoppers are mostly adolescents engaging in new food habits, as is the case in Europe. The European fast food market is converging in one of the biggest in the world, with a total revenue of \$34.2 billion in 2009, representing a compound annual growth rate of 4.7% for the period spanning 2005-2009 (Datamonitor, 2011). Spain concentrates 3.9% of this European market, whereas the United Kingdom is the leader with a share of 22.8%, followed by France (18.8%), Germany (17.7%) and Italy with 7.1%. Study findings suggest that adolescents choose unhealthy foods on special occasions (parties, celebrations), and when socializing (Chan et al., 2009). Adolescents' lifestyles have been associated with multiple risk behaviors, especially failing to meet the recommended levels for physical activity and fruit and vegetable consumption (Pearson et al., 2009). In addition, adolescents have a reduced ability to absorb information when making food choice decisions in restaurants. Recent research has reported that taste was the most important factor in their meal selection (Elbel et al., 2011).

Our study tests and explores whether a similar informational labeling strategy, similar to that found for packaged foods, results in the consumption of less calories on fast-food menus. We also examined how these effects interact with the demographic and psychological characteristics of consumers. This present research extends the field experiment conducted by Wisdom et al. (2010). However, our research methods used both stated preferences and actual purchasing behavior from the same subjects in order to provide a comparison of results and maximize internal and external research validity. Also, a different set of behavior hypotheses is tested in a different socio-cultural context. In this study, subjects were recruited and data collected in a mid-town in Spain.

Surveys, one of the most used tools to study the impact of information on behavior, allow researchers to use representative cheap samples in their investigations. However, these approaches only provide information about what consumers say they do (stated preferences), and not what they actually do in the market (revealed preferences). Findings have suggested that comparing behavior between these two data sources (Jacoby et al., 1977) generally reveals low positive relations. Self-report measures destroy the dynamic flow of information acquisition affecting the search process and data relevance. Testing the validity of stated preferences in the field, Vossler and Watson (2013) compared survey responses from verified voters with the outcome of a parallel public referendum, finding that the survey under-predicted referendum votes. They stated that negative hypothetical bias among inconsequential survey respondents is also evident in the estimation of willingness to pay, and controlling for consequentiality increases construct validity.

Behavioral economics, on the other hand, can provide very quick and interesting results in terms of understanding consumer preferences and reactions towards multiple

messages in an actual or constructed setting. The goal of using behavioral economics in this real market experiment is to study choices in a way that is subtle enough for people to be unaware of the mechanism (Just and Wansink, 2009). As is well known, behavioral economics combines the behavioral models of psychology with the decision models of economics to help understand how biases in perception, memory, or thought processes may influence purchasing decisions. For example, Just and Wansink (2009) demonstrated that shifting the location of a salad bar dramatically increased sales. However, behavioral results may not be generalizable to broader populations or slightly different circumstances. Consequently, a comparison between more generalizable survey results and behavioral results from the same subjects and under the same circumstances seems a reasonable way to tackle the limitations of both methods.

Consumers' actions in economic experiments are not often compared with survey responses. One aim of this study is to further contribute to this limited literature on external validity. This implies that the cross validation of approaches provides more reliable information and further support for policy decisions, beyond those that are solely based on results from one type of data source.

In the present analysis, we conducted a matching survey and a randomized natural experiment in the same group of participants to investigate the effect of calorie information on food purchasing behavior. In the survey instrument, described later in detail, we also include a nutritional awareness scale (developed by Berning, et al., 2010), and a brief self-control scale "BSCS" (developed by Tangney et al., 2004). Finally, in order to explore the degree to which participants' future choices will resemble their current preferences, we included in the empirical regression the time factor as the number of days elapsed between the day when the interview took place and the actual purchase day at the restaurant. The results obtained from each data source are

compared and contrasted to check for potential differences between what consumers declare on a survey and what they really do in the restaurant when they are on their own. The results of this study are useful to further understand the complexity and limitations faced by consumers in terms of information acquisition in food choices.

Related Research

A number of studies have examined the effect of providing nutritional information, particularly calorie counts, for food purchased away from home. Recent review papers (Harnack and French, 2008) show that despite mixed results reported in some cases (Elbel et al., 2009; Harnack et al., 2008; Yamamoto et al., 2005), most experimental studies find that calorie information does, on average, improve food decisions (Borgmeier and Westenhoefer, 2009; Burton et al., 2006; Downs et al., 2009; Harnack and French, 2008; Loureiro et al., 2012; Ludwig and Brownell, 2009; Temple et al., 2010).

For example, in one experiment, Roberto et al. (2009) found that providing information about calories led to customers selecting smaller meal sizes and also decreased the total number of calories eaten during the day. Bassett et al. (2007) have found that Subway customers who read nutritional information in the restaurant purchased meals with an average of 52 calories less than people who did not read this information. In the same study, one third of Subway customers (37%) reported that nutritional information affected their purchases; these customers purchased meals with 99 calories less than those who just saw the information, but did not consider it. Wisdom et al. (2010) discovered that calorie information also reduces calorie intake, while providing a daily calorie target has the same effect, but only for non-overweight individuals. More recently, Bollinger et al. (2011) compared transaction data from a Starbucks in New

York City before and after calorie posting and in adjacent states without mandatory calorie posting. They found that calorie posting reduced average calories per transaction by 6%, while this effect persisted, and that they were entirely driven by food purchases, while revenues were not adversely affected.

However, the results of many of these previous studies were only comparable among some specific groups. For example, Elbel et al. (2009) focused on low-income neighborhoods, whereas the participants in the study of Roberto et al. (2009) were from mixed backgrounds. Similarly, Bollinger et al. (2011) found a stronger effect among Starbucks consumers with higher education and income. Gender is another important factor. In this sense, Gerend (2009) showed that women chose lower calorie meals and lower calorie items when calorie information was provided, but men's selections were unaffected. In terms of age, Tandon et al. (2010) showed that providing calorie information led to lower-calorie fast food choices when adults ordered for their children, but not when they ordered for themselves.

Other stream of literature, such as Burton et al. (2006) indicated that providing nutritional information did not influence purchasing intentions unless consumer expectations substantially underestimated nutrition levels (i.e., there is a "nutrition label shock"). In the same line, Tangari et al. (2010) reported that calorie disclosure had an inconsistent effect across menu items and restaurant chains, due to different perceptions and initial expectations about the calorie levels of each type of food or of the type of food served in these chains. Droms (2006) and Stubenitsky et al. (1999) also showed that providing nutritional information on menus had no effect on the use of information, the evaluation of food, or consumer food choices in a restaurant setting. The lack of effect was explained by suggesting that people consider eating out a special event where they allow themselves to eat any food, regardless of health considerations (Stubenitsky,

et al., 1999). Droms (2006) also suggested that when making food choices, people consider other important and influential factors besides health benefits, such as the taste of the food or their food preferences. Therefore, the awareness and use of presented nutritional information may be influenced by consumers' individual characteristics, such as motivation to perform healthy behavior, health consciousness, nutritional knowledge and health status (Moorman, 1996). Overall, the results from recent studies suggest that factors such as taste, price, convenience and social relationships tend to be rated as more important considerations than nutritional values when making restaurant meal choices (O'Dougherty et al., 2006; Stewart et al., 2006).

The relevance of many previous studies conducted to evaluate calorie labeling in a restaurant context may be limited due to a number of reasons. Among those studies that evaluated comprehensive calorie labeling, a number evaluated self-reported behavioral intentions rather than actual food purchases (Burton et al., 2006; Yamamoto et al., 2005). Consequently, social desirability bias in reporting is a significant concern. Studies based on intended or hypothetical food choices also fail to incorporate the social nature of food choices and economic factors that may influence food choices.

Roe and Just (2009) took a systematic view across the spectrum of research approaches and discuss the tradeoffs a researcher faces when choosing between research modes. They noted that multi-modal approaches may ease the tensions between internal and external validity. While natural experiments have the advantage of a high degree of internal validity due to their randomized treatments, survey experimenters, who typically rely on representative samples, often claim external validity as well. For all these reasons, and following Roe and Just's recommendations, we conducted a matching survey and a randomized natural experiment to investigate the effect of provision of calorie information on food choices. This multiple approach allows us to

maximize both internal and external research validity, estimating fast food consumers' preferences with the use of data from a survey, and real market behavior data. The results obtained from each data source are compared and contrasted, in order to check for potential differences between what consumers declare on the survey and their actual choices in the restaurant.

Methods

During the month of July 2011, we randomly approached young people in a mid-sized city and invited them to complete a survey on fast food preferences, while offering them a free meal of their choice in the form of a fast food payment coupon (with a random value of 7, 8 or 9€). At the end of the interview participants could immediately spend the coupon in the fast food restaurant that collaborated in this research, or use it during the next 30 days.

The survey asked subjects to rate their hunger level (on a ten-point scale), nutritional awareness levels (scale developed by Berning, et al. 2010), self-control levels (The Brief Self-Control Scale "BSCS"; developed by Tangney et al., 2004), as well as information about eating habits, including frequency of reading food labels, frequency of considering calories when ordering, frequencies of eating at fast-food chains, how much they spent on fast food, whether they were currently dieting, and if they were currently smoking. In the last section the survey, subjects were asked to state their height and weight, together with other socio-economic and demographic information.

To analyze the effect of calorie information on consumers' stated preferences in the survey context, we used the Best-Worst (BW) approach, applied by Louviere and Flynn (2009). This approach overcomes certain problems presented by other measurements and rating methodologies (Finn and Louviere, 1992). Participants are only requested to

choose the endpoints (one most and one least preferred item in each choice set) of their preferences. The menu choices provided in the survey resemble popular food menus provided by fast food restaurants, including 7 different main menus offered by this fast food restaurant, which included less healthier options (made with burgers, fries and soda drinks) and one healthier option (made with salad, fries and drink). In the survey design, we distinguished between a control and a treatment group. The control group viewed the choice sets including pictures of the dishes and corresponding prices. The treatment group got the same choice sets plus information about calories. When offered, the calorie information was presented as the total calories contained in each of the menus. In each choice set, respondents were simply asked to identify the most and the least preferred option among the three menus presented in each choice occasion. The aim of this survey was to anticipate the effect that nutritional information has on food choices.

To track the effect of calorie information on consumers' actual market choices (in the restaurant), participants were given coupons as a sign of gratitude for taking part in the survey. We recovered the payment coupons and purchasing tickets of participants who ate their meals at the fast food restaurant. Each completed survey had a matching number corresponding to each participant's code, identical to the payment coupon code. In order to provide flexibility to this natural experiment, we allowed the coupons to be redeemable for 30 days, so that participants could use them any time during this period to buy a meal. This last step of the experiment was aimed at finding out whether participants acted accordingly to their stated preferences after the control group received the nutritional information at the time of conducting the survey.

Data

A total of 174 participants were recruited from the university campus or in locations close to the fast food restaurant. During the study, more than half of the customers who were approached agreed to participate. Fifty-two percent of participants were women, and the majority of subjects were university students, with an average age of 24 years (ranging between 18 to 36 years). The average body mass index (BMI), calculated as the ratio of self-reported weight in kilograms to squared height in meters was 24, and thirty-one percent of participants were overweight by conventional standards (BMI \geq 25). In addition, five percent of participants reported that they were dieting (Balanced, sports and Dukan diet), and thirty-five percent were identified as smokers. The participants reported a mean hunger level of 6 (on a 1-to-10 scale).

On average, the participants reported that they visited a fast food restaurant chain about three times per month. Those who reported eating usually at fast-food restaurants were younger students with secondary studies, moderate physical activity (daily), with weight problems (over or below normal), whose parents both work and tend to belong to low income brackets. However, eating in these establishments decreases significantly with age, nutritional awareness and household size. Participants reported that they spent an average of 6 euros per week on fast food. However, these expenses decrease significantly with education, household size and the degree of self-control.

Seventy-five percent of the participants reported that they sometimes or always used nutritional labels when buying food, and over half of the participants (57 percent) reported that they sometimes or always think about calories when making food purchases. Respondents who stated that they sometimes or always read food labels or consider calories when making food purchases were more likely to be female, university

students, with a regular daily physical activity, normal body weight and living in urban areas.

The participants reported a mean nutritional awareness degree of 27 (ranging possible scores from 7 “low nutritional awareness” to 49 “high nutritional awareness”), and a mean self-control degree of 38 (Possible scores range from 13 “low self-control” to 65 “high self-control”). Respondents with higher levels of nutritional awareness were university students, with normal body weight and who always read food labels. Respondents with a high level of self-control were mainly college students, with normal body weight, who always read food labels and always consider the calories when making purchases.

Results

The results obtained from the survey and market experiment are reported below. The log of the number of calories selected were modeled via an OLS regression, controlling for demographic characteristics (Table 1), such as age, gender, BMI level, the degree of self-control, as well as calorie information, price and other contextual variables (such as the stated hunger level and the time of the day when purchases were made in the restaurant). The results from both regressions are compared in order to account for informational and contextual variables on food choices.

Informational effect on food choices in the survey context

The average calorie content of the favorite meal was 1143.40 Kcal (Std. Dev. = 392.47). The impact of calorie information on this calorie content of the participant’s most favorite choice was estimated with the OLS regression, controlling for demographic characteristics (Table 2; Column 2).

We find that posting calorie information reduces stated preferences about calorie consumption of the selected meals in the BWS survey exercise by 2.96 percent ($B = -0.0296$, $p=0.024$). Contrary to income, which had no significant effect, price is the factor which has the highest positive effect on calories. For each additional euro in price, participants selected meals with 48.47% ($B = 0.4847$, $p = 0.000$) more calories. This positive relation can be explained by the fact that expensive menus correspond to larger, more caloric burgers, whereas cheap menus correspond to smaller sizes, and less caloric meals (salad option). In addition, for each additional unit on the stated self-control scale, the calorie content in the participants' selected meals was reduced by 0.29% ($B = -0.0029$, $p = 0.003$). Finally, none of the other factors included in the regression had a significant impact on the calories of the selected choices.

Informational effect on actual consumed calories

The average calorie content of participants' actual purchases was 1298.84 Kcal. (Std.Dev. = 302.00). Regression results of actual purchases are displayed in Table 2; Column 3. The results show that providing specific calorie information did not significantly reduce the calorie intake in participants' actual purchases ($B = 0.0114$, $p = 0.469$). As in the survey, income had no significant effect on the calories selected in the restaurant. Although the price effect was less important than in the survey, it was still the factor with the greatest positive impact on the calories selected ($B = 0.1378$, $p = 0.000$). Participants who paid a high price bought high calorie meals (double burgers). In addition, the calorie content of purchases increased significantly with participants' age ($B = 0.0091$, $p = 0.000$). In general, men bought meals with 4.75% more calories than women ($B = 0.0475$, $p=0.005$). Furthermore, similarly to the survey, for each additional unit in the self-control scale, the calorie content in the selected meals

decreases by 0.90% ($B = 0.0090$, $p = 0.000$). Finally, BMI did not have a significant impact on the calorie content.

In conclusion, we find that posting information about calories reduces calorie intake from the selected meals in the survey by 2.96 percent. However, providing nutritional information did not have any significant impact on actual behavior in the fast food restaurant. At the restaurant, participants selected their choice from one information poster display only containing pictures of the products and their prices. After ordering, like any other customer, each participant received their meal on a tray that included the calorie information brochure on the back of the sheet of paper placed underneath the food (which cannot be seen at first glance). When turned over, the calorie information brochure provides the nutritional information associated with each product sold in the restaurant. This implies that overall, the nutritional information currently given by fast food restaurants cannot affect participants' actual purchases ex-ante. However, in the survey phase, half of the participants have received nutritional information about their fast food choices. Nevertheless, our results show that such information had no impact on actual food choices. The most selected option for all participants in the BWS in the survey was the "Double chicken burger" menu (selected 227 times) followed by the "Single chicken burger" menu (selected 224 times) and the salad option (selected 217 times). The favorite option for respondents who received nutritional information in the survey was the "salad" option. In the restaurant, the "Double bacon burger" menu was the most frequently purchased (24 times), followed by the "Single chicken burger" menu (22 times) and finally, the "salad" option (5 times) came in the last position of the ranking (seventh). The most popular selection in the restaurant for respondents who received nutritional information in the survey was the "Double bacon burger" option (See Table 3).

A potential explanation that may help to justify these results is that decisions may be made in an environment of “rational ignorance.” Acting with rational ignorance makes it possible to ignore the ‘dangers’ or long term health risks of making a bad food choice. This may occur because many participants had already decided to eat a large meal on that particular occasion. In general, individuals do not process information when the cost of acquiring it exceeds the marginal benefits of acquiring it (Stigler, 1961).

The lack of the effect of information about the calorie content was explained by suggesting that people consider eating out a special event where they are allowed to eat any type food, regardless of health considerations (Chan et al., 2009; Stubenitsky et al., 1999). Others factors such as taste, convenience and social relationships tend to be rated as more important considerations than nutritional qualities when making restaurant meal choices (O’Dougherty et al., 2006; Stewart et al., 2006). And while adolescents reported that taste was the most important factor in their fast food meal selection (Elbel et al., 2011), adults of different ages consider convenience more important than providing nutritional information (Wisdom et al., 2010).

One interpretation of the positive correlation between the price and calories purchased is that participants who paid a high price bought double burgers. These participants spent the full value of their coupons, and in addition paid the difference between the actual prices and the value of the coupons. Similar results were found by Just and Wansink (2011), where people who paid high prices for the pizza buffet tended to eat more pizza. Thaler’s notion of transaction utility suggests that individuals derive utility from feeling as if they have obtained a good deal (Thaler, 2004). In this research, participants were strongly motivated by transaction utility, given that they increased their consumption in order to take full advantage of their coupons.

Projection Bias in Predicting Future Consumption

To explore the degree to which participants' future food choices will resemble their current tastes, we included two additional variables in the regression: "day period" as a dichotomous variable which indicates whether the participants used the payment coupon in the morning or in the afternoon; and the time factor as the number of days elapsed between the day when the interview took place and the actual purchase day at the restaurant (Table 2; column 3). Column 3 shows that the average calorie content of the participants' actual purchases increases significantly with the number of days elapsed between the day that nutritional information was received in the survey and the real purchase. Each additional day increases consumption by 0.17% of calories ($B=0.0017$, $p<0.011$). Also, participants who used their coupons in the afternoon (after 4.00 p.m.) bought meals with 6.04% more calories ($B = 0.0604$, $p = 0.000$) than those who made their purchase in the morning. This means that predicting the participants' future consumption only based on their current preferences leads to errors or projection bias in these predictions. Because tastes change over time, optimal decision-making often calls for a person to predict and take into account future changes in tastes (Loewenstein et al., 2002).

Our findings suggest that calorie information had a significant impact on stated preferences (elicited by means of a survey) about selected fast food choices, although it did not have any significant impact on actual purchases (actual restaurant consumption). Thus, our findings reinforce the complexity of forming healthier habits and creating long-term changes in diet after information is provided.

Conclusions

Consumers are being provided with increasing amounts of relevant decision-making information in their purchasing environments. The impact of this trend has been to add new dimensions of social and personal importance to shopping behavior, raising major public policy questions. However, to what extent will consumers actually use and thereby benefit from this information? To answer this question, we conducted a matching survey and a randomized natural experiment in the same subjects to investigate the effect of providing calorie information on food purchases. This combined approach allows us to maximize both internal and external research validity, estimating fast food consumers' preferences with the use of data from a survey (stated preferences), and real market behavior. We find that posting information about calories reduces stated calorie consumption of the fast food meals selected in the survey by 2.96 percent. However, providing the same nutritional information to participants did not have any significant impact on real choices in the restaurant context. The "salad" menu (the healthiest option) was the most selected choice for respondents who received nutritional information in the survey, whereas in the restaurant, the "Double bacon burger" option (the least healthy option) was the most popular choice, and the salad menu came in the last position (seventh). Finally, we find that the average calorie content of participants' actual purchases increases significantly (0.17%) with the number of days elapsed between the day when the interview took place (and information was provided) and the actual purchase day at the restaurant. In addition, participants bought meals with 6.04% more calories in the afternoon than in the morning or midday. This means that predicting the participants' future consumption only based on their current stated preferences leads to errors or projection bias, which may become very large over time. Overall, our results show a considerable gap between

actual choices and stated preferences with respect to fast food choices. These results can be used by policy makers, who may be able to develop more efficient strategies that make use of nutritional information.

This is a working draft. Please do not cite without author's permission.

Table 1: Definition of the variables included in the regressions

Variables	Variable description	Mean (Std. Dev)
logcalories (Dependent variable)	Log of calories selected (Quantitative Variable)	sv ¹ . = 6.94 (0.52) re ² . = 7.13 (0.28)
Calorie information (Dichotomous Variable)	“0” if Calorie information was not presented “1” if Calorie information was presented	50.00% 50.00%
Male (Dichotomous Variable)	“0” for female “1” for male	52.00% 48.00%
Age (Continuous Variable)	Number of years	24.00 (3.40)
Body mass index (Kg / M ²) (Continuous Variable)	Calculated as the ratio of self- reported weight to squared height	24.00 (3.90)
Hunger (Continuous Variable)	Hunger degree	06.01 (2.28)
High Income (€ / month) (Dichotomous Variable)	“0” for income less than 2.500 € / month “1” for income more than 2.500 € / month	66.00% of the sample 34.00% of the sample
Price (€)	Price of favorite meals or price of actual purchase	sv ¹ . = 07.56 (0.95) re ² = 05.23 (3.73)
Self-control (Continuous Variable)	Self-control degree	38.48 (6.59)
Number of days (Continuous Variable)	Number of days elapsed between the day when the interview took place and the actual purchase day	8.07 (11.34)
Day period (Dichotomous Variable)	“0” if morning “1” if afternoon	47.00% 53.00%

1 sv: survey

2 re: restaurant

Table 2: OLS regressions estimated for survey and market data

logcalories	Stated Preferences (log calories)	Real Consumption (log calories)
Constant	3.4069** (0.0923)	6.2166** (0.1147)
High income	-0.0079 (0.0140)	0.0055 (0.0168)
Age	-0.0009 (0.0020)	0.0091** (0.0026)
Male	-0.0056 (0.0140)	0.0475** (0.0167)
BMI (Kg / M ²)	-0.0001 (0.0018)	-0.0040 (0.0021)
Calorie information	-0.0296* (0.0131)	0.0114 (0.0158)
Self-control	-0.0029** (0.0010)	-0.0090** (0.0012)
Hunger level	0.0038 (0.0029)	/
Price	0.4847** (0.0069)	0.1378** (0.0071)
Day period	/	0.0604** (0.0160)
Number of days	/	0.0017* (0.0006)
<i>Number of participants</i>	174	118
<i>Number of obs</i>	1218 ^a	118 ^b
<i>Prob > F</i>	0.0000	0.0000
<i>R-squared</i>	0.8119	0.3727
<i>Adj R-squared</i>	0.8107	0.3658
* Significant at 5% ** Significant at 1% () Std. Err		

Note: Only half of the participants received calorie information.

a N = 174, seven choice sets, 1218 observations

b 32% of survey participants have not used their coupon

Table 3: Frequency of respondents' selections in the survey and restaurant

Menus (attributes)	Survey+		Restaurant	
	Total	Treatment group	Total	Treatment group
Single chicken burger with cheese	224	111	22	11
Single bacon burger with cheese	137	53	20	10
Single beef burger with cheese	158	72	19	10
Double beef burger with cheese	102	48	10	4
Double bacon burger with cheese	153	75	24	13
Double chicken burger with cheese	227	111	18	10
Salad	217	139**	5	1

+ survey statistics are based on repeated choice occasions, where each participant was given the option to select their favorite menu 7 times. ** Positive correlation between salad selection and provision of calorie information (Pearson $\chi^2(1) = 19.19$, $Pr = 0.000$) in the survey. No significant correlation was found in the market context.

References

- Anderson, Michael L., Matsa, David A., 2010. Are Restaurants Really Supersizing America? *American Economic Journal: Applied Economics*, Forthcoming. Available at SSRN: <http://ssrn.com/abstract=1079584>.
- Bassett, M.T., Dumanovsky, T., Huang, C., Silver, L.D., Young, C., Nonas, C., Matte, T.D., Chideya, S., Frieden, T.R., 2007. Purchasing Behavior and Calorie Information at Fast-Food Chains in New York City, 2007. *American Journal of Public Health* 98 (8), 1457-1459.
- Berning, Joshua P., Chounard, Hayley H., Manning, Kenneth C., McCluskey, Jill J., Sprott, David E., 2010. Identifying consumer preferences for nutrition information on grocery store shelf labels. *Elsevier in its journal Food Policy* 35, 429-436.
- Bollinger, Bryan, Leslie, Phillip, Sorensen, Alan. 2011. Calorie Posting in Chain Restaurants. *American Economic Journal: Economic Policy* 3 (1), 91-128.
- Borgmeier, I., Westenhoefer, J., 2009. Impact of different food label formats on healthiness evaluation and food choice of consumers: a randomized-controlled study. *BMC Public Health* 9, 184.
- Burton, S., Creyer, E., Kees, J., Huggins, K., 2006. Attacking the obesity epidemic: The potential health benefits of providing nutrition information in restaurants. *American Journal of Public Health* 96, 1669-1675.
- Chan, K., Prendergast, G., Gronhoj, A. Bech-Larsen, T. (2009) Adolescents' perceptions of healthy eating and communication about healthy eating, *Health Education* 109 (6), 474-490.

Chou, S.Y., Grossman, M., Saffer, H., 2004. An Economic Analysis of Adult Obesity: Results from the Behavioral Risk Factor Surveillance System. *Journal of Health Economics* 23 (2004), 565-587.

Currie, J., Vigna, S.D., Moretti, E., Pathania, V., 2010. The Effect of Fast Food Restaurants on Obesity and Weight Gain. *American Economic Journal: Economic Policy*, American Economic Association 2 (3), 32-63.

Datamonitor. 2011. *Foodservice: Europe Industry Guide 2011*. Published by Datamonitor on 22 Jun, available at: <http://www.docin.com/p-95881324.html>.

Downs, Julie S., Loewenstein, George, Wisdom, Jessica. 2009. Strategies for Promoting Healthier Food Choices. *American Economic Review* 99 (2), 159-64.

Droms, C., 2006. When I go out to eat I want to enjoy myself: An investigation into consumers' use of nutrition information. *Advances in Consumer Research* 33 (1), 282-283.

Elbel, B., Gyamfi, J., Kersh, R., 2011. Child and adolescent fast-food choice and the influence of calorie labeling: a natural experiment. *International Journal of Obesity* 35, 493–500.

Elbel, B., Kersh, R., Brescoll, V.L., Dixon, L.B., 2009. Calorie Labeling And Food Choices: A First Look At The Effect On Low-Income People In New York City. *Health Affairs* 28 (6), 1110-21.

Finn, A., Louviere, J.J., 1992. Determining the Appropriate Response to Evidence of Public Concern: The Case of Food Safety. *Journal of Public Policy & Marketing* 11(1), 12-25.

French, S.A., Story, M., Neumark-Sztainer, D., Fulkerson, J.A., Hannan, P., 2001. Fast food restaurant use among adolescents: associations with nutrient intake, food choices and behavioral and psychosocial variables. *International Journal of Obesity* 25 (12), 1823-1833.

Gerend, M.A., 2009. Does calorie information promote lower calorie fast food choices among college students? *Journal of Adolesc Health* 44 (1), 84-6.

Harnack, L.J., French, S.A., 2008. Effect of point-of-purchase calorie labeling on restaurant and cafeteria food choices: A review of the literature. *International Journal of Behavioral Nutrition and Physical Activity* 5, 51.

Harnack, L.J., French, S.A., Oakes, J.M., Story, M.T., Jeffery R.W., Rydell, S.A., 2008. Effect of calorie labeling and value size pricing on fast food meal choices: Results from an experimental trial. *International Journal of Behavioral Nutrition and Physical Activity* 5, 63.

Jacoby, J., Szybillo, G.J., Busato-Schach, J., 1977. Information acquisition behavior in brand choice situations. *Journal of Consumer Research* 3, 209-216.

Just, D.R., Wansink, B., 2009. Smarter lunchrooms: using behavioral economics to improve meal selection. *The Magazine of Food, Farm and Resources Issues* 3rd Quarter 24 (3).

Just, D.R., Wansink, B., 2011. The Flat Rate Pricing Paradox: Conflicting Effects of “All-You-Can-Eat” Buffet Pricing. *The Review of Economics and Statistics* 93 (1), 193-200.

Loewenstein, G., O'Donoghue, T., Rabin, M., 2002. Projection Bias in Predicting Future Utility. *The Quarterly Journal of Economics* 118 (4), 1209-1248.

Loureiro, M.L., Yen, S.T., Nayga, R.M. 2012. The effects of nutritional labels on obesity. *Agricultural Economics* 43 (3), 333–342.

Louviere J., Flynn T., 2009. *Advances in Best-Worst Scaling and Choice-Based Measurement Methods*. UTS Centre for the Study of Choice 2009. The University of Technology, Sydney.

Ludwig, D.S., Brownell, K.D., 2009. Public Health Action Amid Scientific Uncertainty: The Case of Restaurant Calorie Labeling Regulations. *Journal of the American Medical Association* 302 (4), 434-35.

Moorman, Christine. 1996. A quasi-experiment to assess the consumer and informational determinants of nutrition information processing activities: The case of the Nutrition Labeling and Education Act. *Journal of Public Policy and Marketing* 15 (1), 28-44.

O'Dougherty, M., Harnack, L., French, S., Story, M., Oakes, J., Jeffery, R., 2006. Nutrition labeling and value size pricing at fast-food restaurants: a consumer perspective. *American Journal of Health Promotion* 20, 247-250.

Pearson, N., Andrew J Atkin, A.J., Biddle, S., Gorely, T., Edwardson, C., 2009. Patterns of adolescent physical activity and dietary behaviours. *International Journal of Behavioral Nutrition and Physical Activity* 6, 45.

- Roberto, C.A., Larsen, P.D., Agnew, H., Baik, J., Brownell, K.D., 2009. Evaluating the Impact of Menu Labeling on Food Choices and Intake. *American Journal of Public Health* 100 (2), 312-8.
- Roe, B.E., Just, D.R., 2009. Internal and External Validity in Economics Research: Tradeoffs between Experiments, Field Experiments, Natural Experiments and Field Data. *American Journal of Agricultural Economics* 91 (5).
- Stewart, H., Blisard, N., Jolliffe, D., 2006. *Let's Eat Out: Americans Weigh Taste, Convenience, and Nutrition*. Washington, DC: USDA ERS; 2006.
- Stigler, G., 1961. The Economics of Information. *Journal of Political Economy* 69, 213-225.
- Stubenitsky, K., Aaron, J.I., Catt, S.L., Mela, D.J., 1999. The influence of recipe modification and nutritional information on restaurant food acceptance and macronutrient intakes. *Public Health Nutrition* 3(2), 201- 209.
- Tandon, P.S., Wright, J., Zhou, C., Rogers, C.B., Christakis, D.A., 2010. Nutrition Menu Labeling May Lead to Lower-Calorie Restaurant Meal Choices for Children. *Pediatrics* 125 (2), 244-48.
- Tangari, A.H., Burton, S., Howlett, E., Cho, Y.Na., Thyroff, A., 2010. Weighing in on fast food consumption: the effect of meal and calorie disclosures on consumer fast food evaluations. *Journal of Consumer Affairs* 44(3), 431-462.
- Tangney, J.P., Baumeister, R.F., Boone, A.L., 2004. High Self-Control Predicts Good Adjustment, Less Pathology, Better Grades, and Interpersonal Success. *Journal of Personality* 72 (2), 271-324.

Temple, J.L., Johnson, K., Recupero, K., Suders, H., 2010. Nutrition labels decrease energy intake in adults consuming lunch in the laboratory. *Journal of the American Dietetic Association* 110 (7), 1094-7.

Thaler, R.H. 2004. Mental Accounting Matters. In Camerer, C.F., G. Loewenstein, and M.Rabin (eds.) *Advances in Behavioral Economics*. Russell Sage Foundation. Princeton, NJ: Princeton University Press, 74 – 103.

United State Department of Health and Human Services. 2001. The Surgeon General's Call to Action to Prevent and Decrease Overweight and Obesity. Rockville, Md: US Dept of Health and Human Services, Public Health Service, Office of the Surgeon General. Available at: <http://www.cdc.gov/nccdphp/dnpa/pdf/CalltoAction.pdf>.

Vossler C.A., Watson, S.B., 2013. Understanding the consequences of consequentiality: Testing the validity of stated preferences in the field. *Journal of Economic Behavior & Organization* 86, 137–147.

Wisdom, J., Downs, J.S., Loewenstein, G., 2010. Promoting Healthy Choices: Information versus Convenience. *American Economic Journal: Applied Economics* 2, 164–178.

World Health Organization (WHO). 2008. Overweight: Situation and trends. Available at http://www.who.int/gho/ncd/risk_factors/overweight_text/en/index.html.

Yamamoto, J.A., Yamamoto, J.B., Yamamoto, B.E., Yamamoto, L.G., 2005. Adolescent fast food and restaurant ordering behavior with and without calorie and fat content menu information. *Journal of Adolescent Health* 37, 397-402.