Obesity and Self Control: Evidence from Food Purchase Data*

Ying Bao†
University of Toronto

Matthew Osborne‡
University of Toronto

Emily Wang§
University of Massachusetts Amherst

Edward C. Jaenicke¶
Penn State University

November 15, 2018

"This research was supported in part by the intramural research program of the U.S. Department of Agriculture, Economic Research Service."

*We thank seminar participants at University of Maryland, University of Toronto and the Marketing Science Conference for helpful feedback. We have benefited from helpful discussions with Avi Goldfarb and Aviv Nevo.

†Rotman School of Management, 105 St George St, Toronto, ON, Canada M5S 3E6. Email: ying.bao14@rotman.utoronto.ca.

‡University of Toronto, Institute for Management and Innovation and Rotman School of Management, 3359 Mississauga Road, Suite 2200, Mississauga, ON, Canada L5L 1C6. Email: matthew.osborne@rotman.utoronto.ca

§University of Massachusetts Amherst, Department of Resource Economics, 80 Campus Center Way, Amherst, MA 01003. Email: emilywang@resecon.umass.edu.

¶Penn State University, 208C Armbsy University Park, PA 16082. Email: tjaenicke@psu.edu.

Abstract

Is obesity related to self-control? We assess this question using a novel and unique dataset that links individual-level scanner data on food purchases to survey data containing questions about an individual's obesity status. We find that obese individuals have higher purchase shares of unhealthy goods, are more likely to purchase products offered in checkout lanes that exploit consumer temptation, and are more sensitive to price discounts in product categories that are both unhealthy and tempting. We find no differences in price sensitivity across obesity levels in comparable product categories that would not be considered tempting. We show that our empirical results are consistent with the model of self-control developed by Gul and Pesendorfer (2001, 2004), but do not find systematic support that more obese individuals are more myopic or present-biased, in contrast to earlier research.

Keywords: Obesity, self-control, scanner data, marketing and health

1 Introduction

Fighting obesity and the chronic illnesses associated with it has become a priority in the worldwide political agenda. Unfortunately, this no longer comes as a surprise to most people, as the percentage of obese men rose from 3.2% in 1975 to 10.8% in 2014 and that of obese women rose from 6.4% to 14.9% in the same period across 186 countries (NCD Risk Factor Collaboration, 2016). These figures are even more alarming in developed countries. For example, the percentage of obese adults in the U.S. increased from 30.5% in 2000 to 37.5% in 2014 (Center for Disease Control, 2015). In addition to the cited higher mortality incidence, other justifications for public intervention include increased medical expenses and increased health insurance premiums derived from obesity, as well as productivity losses in the labor market (Fletcher, 2011). The estimated figure of annual U.S. health care cost for obesity-related illnesses is $190.2 billion, or about 21% of annual U.S. medical expenditures (Cawley and Meyerhoefer, 2012).

As researchers and policy makers rush to find a solution, many aspects of the obesity epidemic have in consideration. For instance, Dubois et al. (2014) explore the role price plays on diet differences across counties and conclude that the economic environment and differences in preferences is needed to explain said diet differences on top of price. Relatedly, many researchers have proposed that socio-economic differences may drive the diet differential between the poor and the rich. This hypothesis was rejected by Bronnenberg et al. (2012), who finds that faced with the same alternatives at the same prices, poor households would continue to have a worse diet than their richer counterparts. On some level, this may serve to justify the multitude of sin taxes that have been proposed across the world. Early evidence on the effectiveness of these policies are mixed, with some showing a lack of decreased consumption of junk foods such as soda (Wang 2015; Wang et al. 2017) and some showing limited decreased consumption (Taylor et al. 2016; Debnam 2017). Sin taxes are by no means the only policy tool available or explored. In a recent paper, Dubois et al. (2018) studies the effect of banning advertising of junk foods. They find that any potential improvement gain with advertising ban may be offset by lowered prices and substitution to other junk foods on the part of the consumer.

As shown by previous literature, consumer preferences play a central role in the obesity epidemic. Furthermore, recent findings suggest that a number of policies targeting the reduction of unhealthy foods are limited success. This implies that research looking into various types of behavioral biases and obesity could be fruitful.

One relationship that has been explored in a number of recent studies is that between obesity and time preferences: Obese individuals appear to be more myopic or present-biased (Courtemanche et al., 2014; Zhang and Rashad, 2008; Borghans and Golsteyn, 2006; Smith et al., 2005; Komlos et al., 2004). These studies typically rely on quantifying the correlation between a proxy for the discount factor that is measured with a survey question and a measure of an individual's BMI. It is well-known that myopia, as measured by a lower rate of time preference, can proxy for many different behavioral biases (Frederick et al., 2002). As a result, the nature of the types of biases that are correlated with obesity remains an open question. In particular, are obese people more obese because they are more impatient than the rest of the population, or does the measured rate of time preference reflect some other bias, such as self-control?

In this paper we provide evidence from field data that obesity is related to self-control problems, using a unique dataset that relates food purchase to Body Mass Index (BMI), a widely-used measure of obesity. Our purchase data is a large-scale panel dataset derived from the IRI Homescan data, which tracks purchases of grocery products at the household level for the years 2010 to 2016. This purchase data is linked to a comprehensive survey on lifestyle and health conditions for all members of each household in the panel. In particular, for single person households we know both what an individual purchases, as well as the individual's BMI. Focusing on such households, we find that higher BMI individuals display behavior that is consistent with self-control problems. In particular, their expenditure shares of unhealthy products are higher than individuals who are not obese. Further, they are more likely to purchase products commonly offered at the checkout counter which are designed to tempt consumers and exploit lack of self-control, such as candy bars or gossip magazines. Finally, we find that for tempting and unhealthy product categories, such as ice cream or potato chips, obese individuals are more price sensitive than individuals who are not obese. Importantly, we find no difference in price sensitivity across obesity levels in similar product categories that would not be thought of as tempting, such as frozen vegetables, dry pasta, or packaged salads. This latter finding rules out an alternative explanation to self-control, which is that obese individuals are generally more price sensitive, perhaps due to having lower income.

We show that our findings above are consistent with the model of self-control costs developed by Gul and Pesendorfer (2001, 2004). However, some of our findings (particularly those related to price sensitivity) could also arise if more obese individuals are more myopic or present-biased than individuals who are not obese. To rule out this theory, we turn to examining a different type of forward-looking behavior: stockpiling of storable goods. If obese individuals are less forward-looking than non-obese individuals, they should be stockpile less than individuals who are not obese, even in categories that are not tempting such as pasta or frozen vegetables. We apply reduced form tests for the strength of stockpiling behavior developed by Hendel and Nevo (2006) to a wide number of storable categories, and find no evidence that obese individuals behave in a less forward-looking way.

Even as policy makers rush to find a solution, we know that in many health contexts people appear resistant to undertaking costly behaviors that are beneficial to health (Ogden et al., 2007). Two strategies that have been used recently to approach the growing obesity problem are taxes on unhealthy foods (such as soda) and information campaigns. Additionally, regulatory authorities are considering policies that remove unhealthy and tempting products (such as checkout candy) from consumers' choice sets.[1] The effectiveness of these different strategies will be a function of the types of behavioral biases that drive obesity. For example, our finding that self-control is an issue suggests that strategies which remove alternatives from the choice set (even if they are not chosen) will improve welfare. Our findings provide support for such regulations, and we provide suggestive evidence that they could be effective in reducing obesity. In particular, we find that increases in consumption of unhealthy goods lead to substantial increases in weight. For example, a person who reduced her yearly consumption of the unhealthy products we examine by half would lose about 35 pounds.

Turning to policies that have been implemented, our results also support the use of taxes on unhealthy foods. In practice, these taxes have been applied to soda or sugar-sweetened-beverages, rather than food products. Examples include the Berkeley, CA implemented a penny-per-ounce tax on all sugar-sweetened beverages on January 1, 2015 the first of its kind; Philadelphia, PA approved a 1.5-cents-per-ounce tax on all soda (regular and diet) that became effective on January 1, 2017; and the latest 1.75-cents-per-ounce tax on sugar-sweetened beverages passed the city council vote on June 5th, 2017. No consensus has been reached on whether taxation of sugary drinks is effective in decreasing obesity. Some studies (Falbe et al., 2015; Cawley and Frisvold, 2017; and Silver et al., 2017) show that despite limited pass-through of the tax onto the products, consumption shows both statistically significant and economically meaningful decreases. Others (Rojas and Wang, 2017) find limited evidence of any actual consumption change. Our empirical findings suggest that an alternative avenue for such taxes could be to target unhealthy foods, rather than carbonated drinks.

Evidence on whether education and information campaigns affect obesity is similarly mixed (Hornik, 2002; Randolph and Viswanath, 2004; Elbel et al., 2009). One explanation for the limited success of such strategies is that they do not actually inform consumers, for example, about the long-term health effects of obesity. Another possibility is that individuals may be informed, but do not value their long term health, or cannot overcome self-control problems. Our empirical work provides two suggestive pieces of evidence that self-control

[1]The U.K. has recently proposed regulation to ban the sale of candy at grocery store checkout counters (https://www.telegraph.co.uk/politics/2018/06/01/supermarket-guilt-lanes-two-for-one-junk-food-offers-will-banned/).

plays an important role over and above possible lack of information. First, our data contains several survey questions that should be related to the amount of information an individual has about the consequences of obesity. In particular, we know if an individual is suffering from a obesity-related condition such as high cholesterol, heart problems or diabetes. Upon diagnosis of such a disease it is likely the individual's doctor would inform the patient about ways to curb obesity such as healthy eating. We also know whether an individual displays concern about his or her weight, or if the individual considers his or her obesity to be a disease condition. We find that the price sensitivity of individuals who are more likely to understand the adverse impact of consumption of unhealthy goods (i.e., those with disease conditions, or displaying concern about weight), does not differ from individuals who are less likely to be informed. Second, as we have already described, obese individuals are more susceptible to purchasing tempting products that have no effect on weight, such as gossip magazines. Our finding for a role of self-control above information is consistent with previous work by Oster (Forthcoming), who identifies households who may have been diagnosed with diabetes and hence informed about its long-term effects. She finds that households engage in significant but small calorie reductions following diagnosis, which further suggests that individual behaviors are difficult to alter.

An additional contribution of our work is that it generalizes the findings of an earlier experimental study by Toussaert (2018) to field data. In particular, Toussaert (2018)'s experiment suggests that a significant subsample of the population finds it difficult to manage their weight, and is aware of their self-control problems, supporting the theory of Gul and Pesendorfer (2001). Interestingly, in our regressions of the likelihood of purchasing a tempting category on BMI, category-level prices and other controls, we find that BMI has a negative effect on incidence when we control for deals. This suggests that more obese individuals would, all else equal, be less likely to buy unhealthy foods. Their overall higher purchase shares of unhealthy products appear to be largely due to the fact that they are sensitive to low prices for these goods. Both of these empirical findings are consistent with the Gul and Pesendorfer (2001, 2004) self-control theory.

We structure the remainder of the paper as follows. Section 2 describes our data and how we construct our sample. In section 3, we document how the food purchase behavior of individuals is correlated with BMI, with a focus on empirical evidence that could be consistent with self-control problems. Section 4 develops a simple theory of self-control in the context of food purchase based on Gul and Pesendorfer (2001), relates the implications of the theory to the empirical findings, and considers alternatives. We conclude in Section 5.

Table 1: Number of Households

Year	Homescan # of Households	1 Person Homescan # of Households	Medprofiler # of Households	1 Person Medprofiler # of Households
2010	60,658	15,483	38,750	8,009
2011	62,092	15,859	48,701	9,534
2012	60,538	15,303	39,651	8,570
2013	61,097	15,615	47,040	10,574
2014	61,557	15,703	41,573	9,828
2015	61,380	15,424	45,264	9,942
2016	63,150	15,375	41,163	9,470

2 Description of the Data and Sample Selection

Our analysis makes use of three datasets: the IRI Homescan data, a survey linked to the Homescan data called Medprofiler, and Nielsen's store level price and quantity data. The IRI Homescan panel is analogous to the Nielsen Homescan panel that has been used in a lot of past empirical work in industrial organization and marketing, and tracks individual purchases of grocery products over time. The Medprofiler survey is a large-scale survey that is administered by IRI to all Homescan panelists. The survey includes a broad range of health-related questions, in particular related to an individual's obesity status, eating/exercise habits, as well as different kinds of health conditions. The Medprofiler data that was available to us covers the years 2010 through 2016. About one third of Homescan households complete the Medprofiler survey: The number of households in the Homescan panel, and those who are in the Medprofiler data, are shown in the first two columns of Table 1.

We limit the sample in our analysis to one person households who complete the Medprofiler survey. We use one person households because in much of our analysis, we will quantify the relationship between a shopper's BMI and their purchase behavior. The Homescan data does not identify which member of the household is shopping in a given trip, so we can only match shopping trips to household members in one person households. Even though our sample is limited to one person households, as can be seen in the third column of Table 1, we still retain about eight to ten thousand households every year. When we construct our sample of 1 person households we exclude households who never make purchases in the five year period of the data, as well as individuals who appear to have had a baby during the sample period. Regarding the latter exclusion, we wish to focus our analysis on individuals who are obese for reasons other than pregnancy, which is temporary.

In Appendix Tables 13 through 19, we document how the distributions of several observable demographic variables in our sample of one person households compares to that of the entire Medprofiler sample. In particular, both samples are similar in terms of ethnicity, Hispanic origin and education.[2] The samples differ somewhat in age and gender composition. In particular, over 70% of one person households are female while around 50% of individuals in all households in the Medprofiler dataset are female. Moreover, about 28% of one person households are over the age of 65, while in the entire Medprofiler dataset, only 19% of individuals are above 65. To make sure our empirical results are not skewed by sample differences, we include either individual fixed effects or a rich set of individual controls in all our regressions.

A comparison of the distribution of BMI, one of our main variables of interest, between the entire Medprofiler dataset and one person households is shown in Table 2. The BMI is defined as an individual's body mass, measured in kilograms, divided by the square of the individual's height, measured in meters, and is a commonly used measure of obesity in clinical practice. Individuals are typically classified into one of five BMI brackets, which are shown in the first column of the table. The second shows the BMI cutoffs used to assign an individual to a particular bracket. Our sample (both the Medprofiler and the one person sample) exclude individuals who are under the age of 20 because the typical BMI bracket designations do not apply to individuals under that age. There are two important points to take away from this table: First, the distributions of BMI brackets are similar for both the Medprofiler and the one person household sample. Second, the BMI distribution presented in the table is very similar the population distribution of BMI in the United States during this period (Center for Disease Control, 2015). This latter point is notable, because although individual weight is self-reported, the fact that BMI as measured in the survey mimics the nationalwide distribution of BMI suggests that there are not systematic biases in how individuals report their weight. Appendix Figures 1 and 2 show the distributions of weight in pounds, as well as BMI, for individuals over 20 years old for both samples. These graphs also make it clear that the BMI distributions are similar for the one person and entire Medprofiler samples.

The Medprofiler survey asks a number of questions about how individuals perceive their weight, and how they are treating their obesity. We tabulate the answers to these questions across different BMI brackets for one person households in Table 3, as well Appendix Tables 20 through 24. Table 3 shows how the answers to three relevant questions about weight perceptions varies across different BMI brackets. In the first question, respondents were asked how concerned they were about their weight. As one might expect, more obese individuals tend to more concerned about their weight. The second question asks how individuals perceive their weight. Although many obese and extremely obese individuals recognize they are

[2] In multi-person households, we measure household level education and age as the maximum value of these variables across the female and male household head. Ethnicity is measured as ethnicity of the household head.

Table 2: Distribution of BMI Brackets (Person-year level)

BMI Bracket	BMI Ranges	Medprofiler Percent household-years	1 Person Medprofiler Percent household-years
Underweight	< 18.5	1.79	1.71
Healthy	$18.5 - 24.9$	28.39	27.61
Overweight	$25 - 29.9$	33.64	32.16
Obese	$30 - 39.9$	28.44	29.36
Extremely Obese	≥ 40	7.74	9.16

overweight, over 50% of obese individuals described themselves as slightly overweight, suggesting that some individuals have biased perceptions about their weight. Some additional support for this idea can be seen in the second panel of Appendix Table 20: Around 30% of individuals in the obese BMI bracket believe they are much healthier than most people of the same age, and about 50% of overweight individuals have the same belief. The third panel of the Table 3 addressed the question of whether obese individuals are treating their condition. It is interesting that many overweight to obese individuals identify themselves non-sufferers of obesity (in other words, they do not recognize it as a disease) and very few obese or extremely obese individuals treat their condition.

Tabulations of the answers to some additional related questions about health and eating and exercise habits are shown in Appendix Tables 20 through 24. In particular, the third panels of Appendix Tables 20 and 21 address an individual's attitude towards exercise and exercise habits. As individuals get more obese, they place less importance on exercise. Turning to eating habits, it can be see in the first two panels of Table 21 that more obese individuals eat more desserts and snacks, and more fast food. Interestingly, there seems to be little variation across BMI brackets in how likely people say they are to read nutritional labels (fourth panel, Appendix Table 20). The Medprofiler survey also includes separate questions asking if an individual is on a low-calorie diet, a low carb diet, a low fat diet or a low sugar diet. Appendix Table 23 shows the percentage of individuals who say they are at least one of these diets, by BMI bracket. The more obese individuals become, the more likely they are to claim they are on a diet.[3] Appendix Table 24 shows a cross-tabulation of our diet variable with the weight concern question. If an individual is concerned about his/her weight, he or she is more likely to claim to be on a diet. Interestingly, about 40% of individuals who claim that they are very concerned about their weight are not on any diet.

[3]We produced similar tables for each different diet type, but found similar patterns.

Table 3: Answers to Questions Related to Weight

	Underweight	Healthy	Overweight	Obese	Extremely Obese
Weight Concern					
Very Concerned	15.27	10.43	21.23	46.89	71.12
Somewhat Concerned	32.85	45.94	65.25	49.55	26.92
Not at All	51.88	43.63	13.52	3.55	1.95
Weight Description	Underweight	Healthy	Overweight	Obese	Extremely Obese
Slightly Underweight	66.16	8.40	0.81	0.55	0.15
About Right	25.68	69.46	18.34	1.97	0.36
Slightly Overweight	6.64	21.88	77.52	54.21	9.67
Very Overweight	1.52	0.25	3.33	43.26	89.82
How are you treating obesity	Underweight	Healthy	Overweight	Obese	Extremely Obese
Rx Only	0.08	0.08	0.27	1.04	2.27
OTC Only	0.24	0.29	1.38	5.12	7.64
Dual	0.16	0.11	0.18	0.79	1.70
Suffer, do no treat	1.20	0.40	3.90	27.81	54.42
Non-sufferer	98.32	99.12	94.28	65.24	33.97

3 Obesity and Food Purchases

In this section, we will analyze how purchases of food categories and sensitivity to prices and deals varies across BMI brackets. We are particularly interested in understanding whether obese individuals respond differently to marketing variables, such as prices, than non-obese individuals in categories that are unhealthy and tempting: in particular, where it may difficult for individuals to exert self-control and resist purchasing a food item in the category.

In analysis for this section, we further restrict our sample to individuals who are below 65 years old. We do this for a number of reasons. First, the BMI calculation may not be a good indicator of health for the elderly (Diehr et al., 2008). Second, an individual's lifestyle may change significantly after the age of 65, when most people in the United States retire.[4] Retired individuals may exhibit substantially different behavior than those who are working. Third, our data oversamples individuals above the age of 65, and including these individuals may skew our results if their behavior is substantially different from the general population. Excluding the elderly reduces our sample size by 29%.

Table 4 shows the expenditure shares of different food categories for different BMI brackets. The top panel, labeled "Broad Category Definition", shows the expenditure shares

[4] About 70% of the US population aged 65 or above is retired, see https://www.bls.gov/opub/btn/volume-4/people-who-are-not-in-the-labor-force-why-arent-they-working.htm.

for a number of broadly defined categories that encompass all grocery purchases.[5] The line "Magnet Data" shows the expenditure share for IRI's magnet products, which do not have standard UPC codes. These products include fresh fruits and vegetables, fresh meat, and bakery goods. It is notable that obese individuals spend proportionately more on categories that could be considered unhealthy, such as frozen foods, deli products, and packaged meats. The second panel of the table shows the shares of a narrower set of categories. It is notable that more obese individuals spend proportionately more of their monthly grocery expenditures on diet soda, ice cream, baked desserts, salty snacks and chocolate candy, while they spend less on healthier goods such as fruits and vegetables (fresh or frozen), packaged salads, pasta, cereals, or juice. Interestingly, more obese individuals are also spending less on regular sodas but more on diet sodas. It is possible that since the negative health effects of soda have been heavily publicized, more obese individuals will switch to diet sodas in an effort to lose weight.

Many of the product categories that are purchased more by more obese individuals (such as ice cream or chocolate candy) could be considered to be tempting, and the purchase of such products may be consistent with self-control issues. To provide some further evidence that obese individuals seem to be more attracted to tempting products, in Table 5 we regress a dummy variable for whether an individual purchases a product that is offered at the checkout counter on the individual's bmi bracket. We examine two different product categories: chocolate bars in sizes that are offered at checkouts, and gossip magazines such as National Enquirer. Prior research suggests that products are offered at the checkout in order to take advantage of consumers' self control issues (Cohen and Babey, 2012). It is especially notable that more obese individuals are more prone to purchasing gossip magazines, even though these products are non-food products. In the table, specification 1 is a regression with no other controls, while specification 2 includes a rich set of household controls. We do not find significant effects of obesity in a regression with individual fixed effects.

We next investigate whether individuals with different obesity levels appear to be more deal sensitive, especially in product categories that are unhealthy or tempting. In Table 6, we regress a dummy variable for whether a particular product in a trip is purchased on deal or not on characteristics of the product category and individual. In the table, specification (1) includes no extra controls, specification (2) includes a large set of individual controls, and specification (3) includes individual fixed effects. We classify product categories as healthy or unhealthy ourselves, and as storable or perishable following Bronnenberg et al. (2008). Overall, we find that more obese people are not more likely to make purchases on deal, and do not seem to be more likely to purchase storable goods on deal. However, there is some evidence of a positive interaction between BMI and unhealthy categories being purchased

[5] The category definitions we use correspond to IRI's department codes.

Table 4: Monthly spending shares, by product category and household BMI

Broad Category Definition					
Category	Underweight	Healthy	Overweight	Obese	Extreme Obese
Dry Grocery	43.5076	41.0185	40.2315	40.6613	40.6289
Frozen Foods	12.6688	12.4393	12.9567	13.3778	13.7362
Dairy	7.6054	8.9240	8.9570	8.9742	9.5708
Deli	5.1328	6.0050	7.0477	7.6760	9.2846
Packaged Meat	2.8464	2.7881	3.3414	3.5089	4.1268
Fresh Produce	4.7636	6.6096	5.8653	5.3520	4.8065
Alcohol	4.0170	5.8797	5.5022	3.5206	1.9958
Magnet Data	19.4583	16.3358	16.0983	16.9292	15.8504
Narrow Category Definition					
Category	Underweight	Healthy	Overweight	Obese	Extreme Obese
Vegetables	1.7277	2.2278	1.9297	1.7070	1.5141
Fruits	2.3284	3.0432	2.5498	2.4143	2.2200
Frozen Vegetables	0.8711	0.7309	0.6274	0.6433	0.6200
Salad	0.3752	0.7644	0.7589	0.7362	0.7309
Pasta	0.2364	0.2617	0.2574	0.2372	0.2366
Cereal	1.9464	1.7744	1.5077	1.3669	1.3682
Regular Soda	1.7492	1.5847	1.7328	1.6539	1.4204
Diet Soda	2.4237	1.7401	1.6960	1.8384	2.4437
Ice Cream	1.0073	0.8157	0.9561	0.9418	1.0622
Desserts	1.7140	1.5414	1.7051	1.7781	1.8965
Snacks	2.1240	2.1520	2.2638	2.3905	2.6553
Chocolate	1.9786	1.9931	2.0280	2.2316	2.4024
Cake	0.1808	0.1598	0.1783	0.1886	0.1957
Juice	1.8612	1.7388	1.7309	1.6257	1.2788
Other	79.4760	79.4719	80.0778	80.2465	79.9551

Notes: This table shows average monthly shares of food expenditures for single person households. We restrict the sample in this table to individuals who are in IRI's magnet households. Categories in the first panel correspond to IRI's department codes, while those in the second are narrower product categories. The other category in the second panel is an aggregate of all uncategorized grocery expenditures.

Table 5: Regression of purchase indicator on BMI bracket: Checkout products

	Chocolate Bars		Gossip Magazines	
Regressor	(1)	(2)	(1)	(2)
Constant	0.021979***	-	0.001829***	-
	(0.000811)	-	(0.000222)	-
Overweight	0.001940*	0.001988*	-0.000113	-0.000029
	(0.001074)	(0.001062)	(0.000284)	(0.000311)
Obese	0.006655***	0.005529***	0.000901**	0.000954**
	(0.001115)	(0.001075)	(0.000435)	(0.000443)
Extreme Obese	0.011499***	0.008949***	0.000812*	0.000906**
	(0.001579)	(0.001541)	(0.000471)	(0.000449)
HH Controls	No	Yes	No	Yes

Notes: The dependent variable in this regression is an indicator for whether a purchase occurs in a category. The chocolate bars category is restricted to chocolate bars between 1 and 4.5 ounces, from major national brands. Magazines identifies a purchase of one of the following magazines: "ABC Soaps in Depth", "CBS Soaps in Depth", "Globe", "In Touch", "Life and Style Weekly", "National Enquirer", "National Examiner", "OK!", "People", "Soap Opera Digest", "Star", "Us Weekly" or "Vogue". Specification (1) includes no controls, while (2) includes the following individual level controls: income, employment, occupation, ethnicity, Hispanic origin, gender, and age dummy variables. The number of observations is 3,378,394. Standard errors are clustered at the individual level. *, **, and *** indicate at the 10%, 5%, and 1% levels, respectively.

on deal. Appendix Tables 25 and 26 show a similar set of regressions, except the BMI variable is replaced with an indicator for whether an individual is obese or extremely obese, or indicators for specific BMI brackets.

The above analysis provides some suggestive evidence that individuals who are more obese are more sensitive to price changes in unhealthy categories. However, the exercise has some drawbacks. First, the dependent variable is only a measure of whether a product is on promotion or not; it would also be useful to know whether obese individuals are more sensitive to price changes in general. A second drawback to the prior exercise is that it relies on accepted, rather than offered, prices: if unhealthy products are put on deal more often in stores where higher BMI individuals shop, then one would expect to see a higher correlation between purchases made on deal and BMI for unhealthy products for this reason, rather than as a result of underlying individual differences. To address these issues, we will quantify the impact of price response across BMI levels at the category level, using prices observed in the store. We will examine 8 specific categories: 4 different categories that are unhealthy and may be tempting to individuals, and 4 comparable categories which are not perceived as tempting. Our 4 tempting categories are ice cream, baked desserts, chocolate candies, and salty snacks, while the non-tempting categories we choose are frozen vegetables, pasta, cereal, and packaged salads (our categorizations are in line with earlier research, for

Table 6: Regression of Probability of Buying on Deal on Characteristics (BMI)

Regressor	(1)	(2)	(3)
Unhealthy Category	-0.0064	0.0075	0.0317***
	(0.0071)	(0.0070)	(0.0049)
Storable Category	0.1485***	0.1511***	0.1319***
	(0.0062)	(0.0060)	(0.0038)
BMI	0.0003*	0.0003**	2.549e-05
	(0.0002)	(0.0002)	(6.220e-05)
Unhealthy × BMI	0.0005**	0.0004**	5.614e-06
	(0.0002)	(0.0002)	(0.0001)
Unhealthy × Storable	-0.0354***	-0.0421***	-0.0586***
	(0.0088)	(0.0086)	(0.0058)
Storable × BMI	-0.0001	-9.615e-05	6.067e-05
	(0.0002)	(0.0002)	(0.0001)
Unhealthy × Storable × BMI	-0.0002	-0.0002	-1.162e-05
	(0.0003)	(0.0003)	(0.0002)
Constant	0.2083***	-	0.2171***
	(0.0049)		(0.0018)

Notes: An observation in this regression is a purchase event of a particular product (UPC). Unhealthy categories are defined as bakery desserts, cookies, ice cream, salty snacks, regular soda, and candy. Neutral/healthy categories are fresh fruits and vegetables, yogurt, milk, eggs, bread, frozen vegetables, cereals, pasta, and diet soda. We define the following categories as storable: ice cream, salty snacks, packaged cookies, candy, frozen vegetables, cereal, pasta, and soda. Specification (1) includes no additional controls, while (2) includes income, employment, occupation, ethnicity, hispanic origin, gender, and age dummy variables. Specification (3) includes household fixed effects. The number of observations is 6,181,783. Standard errors are clustered at the individual level. *, **, and *** indicate at the 10%, 5%, and 1% levels, respectively.

example, Avena et al., 2008; Avena et al., 2012).

The four tempting categories are potentially unhealthy because they are commonly associated with weight gain. To verify this, we regress change in an individual's weight, in pounds, measured in the November survey on the logarithm of an individual's consumption of each category (measured in ounces) for the prior 12 months, controlling for household fixed effects.[6] The results of the regression is shown in Table 7. Three of the four tempting categories lead to weight gain (ice cream, desserts and salty snacks), while only one of the non-tempting categories (pasta) does. It is notable that there is not a statistically significance impact of chocolate candy on weight gain, but this may be due to the fact that the volume purchased of this category is much lower than the other tempting categories, by 30 to 50%. The regression coefficients suggest that the impact of increases in consumption of unhealthy products on weight is substantial. For example, a 10 percent increase in the consumption of salty snacks leads to a weight gain of more than 3 pounds.

We next turn to estimates of regressions similar to equation (1) below:

$$\begin{aligned} y_{ijt} &= \alpha_{ij} + \beta_{1j} BMI_{it} + \beta_{2j} Inv_{ijt} + \beta_{3j} Inv_{ijt} \times BMI_{it} \\ &\quad + \beta_{4j} \log(p_{ijt}) + \beta_{5j} \log(p_{ijt}) \times BMI_{it} + \epsilon_{ijt}. \end{aligned} \tag{1}$$

The dependent variable in this regression is a a dummy variable for whether an individual i purchases a UPC in a particular category j during shopping trip t. BMI_{it} measures the individual's BMI at time t, and Inv_{ijt} is a measure of inventory.[7] The category level price, p_{ijt}, is measured as the weighted average of the prices of all UPCs in category j that are offered in the store where the individual shops during trip t.[8] Prices are measured in price per ounce, the weights in the averaging correspond to the share of units sold of each UPC available in the store in a given week.

Our regression results are shown in Table 8. Specification (1) corresponds to the equation (1), while Specification (2) includes price in levels, as well as a control for especially low prices that appear to be deals. The deal variable is the share-weighted average across UPCs of a dummy variable that indicates whether a product appears to be on deal in a given week. We note that the Nielsen store data does not contain an indicator for whether a product is on promotion, so we have to create this dummy variable ourselves. To do this, for

[6]We use as our independent variables logarithm of one plus volume so that the independent variables are defined if volume is zero. The average volume purchased is large (on the order of hundreds of ounces), so the transformation of adding one to volume should not be problematic.

[7]To measure inventory, we assume a constant daily consumption rate within a category. We compute the consumption rate as the total quantity, in ounces, that the individual purchases over the time she is observed, and divide by the total number of days over which we observe purchases. Inventory at the beginning of day t is measured as total quantity purchased prior to that day minus total consumption. An individual's inventory at the beginning of the sample will be absorbed by their fixed effect.

[8]Prices are measured at the weekly level.

Table 7: Regression of Weight on Logarithm of Past Category Purchase Volume

Category	Estimate
Ice Cream	0.123640***
	(0.047124)
Dessert	0.173294***
	(0.066093)
Chocolate	0.012854
	(0.068770)
Snacks	0.387893***
	(0.084233)
Frozen Vegetables	-0.010079
	(0.052024)
Pasta	0.157696***
	(0.053484)
Cereal	-0.139806**
	(0.064654)
Salad	-0.047764
	(0.066076)
Other	-0.555110***
	(0.129256)
N	38,848

Notes: An observation in this regression is a year-individual pair. The dependent variable measures the individual's weight in pounds in November of year t. Category volume is the log of 1 + total volume, in ounces, purchased between November of year t and October of year $t-1$, inclusive. Regression includes individual fixed effects, and standard errors are clustered at the individual level. *, **, and *** indicate at the 10%, 5%, and 1% levels, respectively.

each UPC and store we compute the quarterly modal price of the UPC, and identify a price as a deal if it is 5% or more below the minimum.[9] This procedure follows Hendel and Nevo (2006); we inspected the price series of some popular products and found that the algorithm seemed to identify temporarily low prices.

Our main coefficient of interest is the interaction between price and BMI, β_{5j}. Focusing on the first column, it is notable that this interaction is negative, indicating that higher BMI individuals are more sensitive to price changes in the ice cream category. We find similar results in the baked desserts and salty snacks categories. Specification 2 provides evidence related to how deal sensitivity varies with BMI. For ice cream, desserts, and snacks, higher BMI individuals seem to respond to overall price changes, but not to more deals; however, in the chocolate candy category higher BMI individuals seem to be more deal-sensitive. It is notable that we find a positive interaction between price and bmi in the chocolate category as well, but this will be swamped by the impact of a deal occurring. Prices are measured in dollars per ounce, and the average price for chocolate is about 0.4, so the impact of a price cut on choice probabilities is quite small. Table 9 shows a similar set of regressions for the neutral categories. What is notable about these regressions is that there are no categories where higher BMI individuals are more sensitive to price changes, or to deals. Overall, these results suggest that more obese individuals are more price sensitive in tempting categories; in particular, they are not more price sensitive overall. To make this conclusion, it is important to compare categories where the only thing that differs is the "tempting-ness" of the category. For example, frozen vegetables and ice cream are similar in terms of prices, storability, package sizes, and share of grocery budget spent; the main differences between the categories are that one is tempting and the other is not. Similarly, bakery desserts and packaged salads are both perishable goods, while chocolate candies and salty snacks are both storable, tempting goods. Pasta and cereal are both storable, non-tempting products.

Turning to the other parameters, it is notable that the coefficient on BMI is sensitive to how we include price - it is negative when we include price in logarithms, but positive when it is included in levels. The negative coefficient suggests that higher BMI individuals might be overall less likely to purchase unhealthy goods. At first glance the negative main effect of BMI seems inconsistent with the purchase shares presented in Table 4, which shows higher BMI individuals have higher spending shares for unhealthy goods. However, our results suggest that higher BMI individuals are more sensitive to low prices in these categories, and their purchase volumes could be higher than non-obese individuals if they tend to shop more at stores where prices of these categories are lower, even if higher BMI individuals have an overall lower preference for such products. There is some support for this hypothesis in the data. Overall, for the categories we examine, obese individuals face prices that are

[9] If there are multiple modes, we take the maximum mode.

3 to 4% lower than individuals who are not obese. In particular, for tempting goods, the difference in prices faced by obese versus non obese individuals is larger than the difference for non-tempting goods by about 15%.[10] Moreover, our theory suggests that if higher BMI individuals have higher self-control costs, and the self-control cost is borne at home, after purchase, higher BMI individuals will be less likely to purchase tempting categories, all else equal.

We present the results of a number of robustness exercises in Appendix Tables 27 through 32. The regression results presented in Tables 8 and 9 restrict the sample to transactions that occur between Oct 1st and Dec 31st, in a 1 month window around the November survey. We choose a window close to the survey because the individual's measured BMI will be most accurate at that time. In Appendix Tables 27 and 28, we examine a wider window of 7 months. In the regressions in Appendix Tables 29 and 30, we replace the BMI variable with an indicator for whether an individual is in the obese or extremely obese BMI bracket, and find similar results, although in the snacks category, the price interactions become insignificant (in this particular specification, the price interactions are significant with a rich set of individual characteristics - it is only with fixed effects we lose significance). We ran additional specifications in Appendix Tables 31 and 32 where the dependent variable is quantity purchased (measured in ounces), given a purchase occurs, but do not find a statistically significant effect of BMI or of the interaction between price and BMI. This latter result suggests that the avenue through which higher price sensitivity in higher BMI individuals manifests itself is that of purchase incidence rather than quantity. For example, more obese individuals will be more likely than non-obese individuals to purchase a package of chocolate if it is on sale, but will not be more likely than non-obese individuals to buy multiple packages.

[10] How we control for prices can affect the estimated main effect of BMI in the following way: Suppose that demand is not linear in prices, i.e., individuals tend to be especially responsive to lower shelf prices. Then using the level price as a regressor will underweight the impact of low prices, leading to a type of endogeneity bias: Higher BMI individuals shop more at cheaper stores (such as Walmart), and purchase more at those stores. The larger observed purchases will be attributed to BMI rather than the especially low offered prices. Note that including a deal dummy variable is different from including log price, because the deal dummy variable captures temporary promotions, not overall lower prices. Some retailers, such as Walmart, use an Everyday Low Price strategy where prices are low but do not offer temporary promotions.

Table 8: Regression of Purchase Indicator on Price and BMI, Tempting Categories

	Ice Cream		Desserts		Chocolate		Snacks	
Regressor	(1)	(2)	(1)	(2)	(1)	(2)	(1)	(2)
BMI	-0.0014*	0.0008**	-0.0021**	0.0013***	0.0003	-0.0023***	-0.0022**	0.0024**
	(0.0007)	(0.0004)	(0.0010)	(0.0005)	(0.0006)	(0.0009)	(0.0010)	(0.0010)
Inventory	-0.0746***	-0.0741***	-0.0680	-0.0678	-0.1776***	-0.1799***	-0.1881***	-0.1874***
	(0.0196)	(0.0196)	(0.0463)	(0.0464)	(0.0435)	(0.0425)	(0.0482)	(0.0481)
BMI × Inventory	0.0014**	0.0013**	-0.0007	-0.0007	0.0025*	0.0025*	0.0018	0.0018
	(0.0006)	(0.0006)	(0.0014)	(0.0014)	(0.0015)	(0.0014)	(0.0015)	(0.0015)
log (Price)	-0.0312***	-	0.0304*	-	-0.0697***	-	-0.0954***	-
	(0.0094)		(0.0155)		(0.0192)		(0.0238)	
log (Price) × BMI	-0.0008***	-	-0.0014***	-	0.0002	-	-0.0019**	-
	(0.0003)		(0.0005)		(0.0007)		(0.0008)	
Price	-	-0.2465***	-	0.1048*	-	-0.1457***	-	-0.2555***
		(0.0728)		(0.0612)		(0.0487)		(0.0764)
Deal	-	0.0147	-	0.0212	-	0.0227	-	0.0009
		(0.0117)		(0.0136)		(0.0187)		(0.0170)
Price × BMI	-	-0.0048**	-	-0.0046**	-	0.0035**	-	-0.0069***
		(0.0024)		(0.0021)		(0.0017)		(0.0025)
Deal × BMI	-	0.0006	-	-0.0003	-	0.0024***	-	-0.0007
		(0.0004)		(0.0005)		(0.0006)		(0.0006)
Constant	-0.0247	0.0668***	0.1540***	0.0784***	0.0636***	0.1787***	0.0351	0.2269***
	(0.0214)	(0.0111)	(0.0296)	(0.0138)	(0.0179)	(0.0246)	(0.0290)	(0.0296)
N	225890	225890	200854	200854	252583	252583	246532	246532

Notes: An observation in this regression an individual shopping trip occurring between Oct 1st and Dec 31st. The dependent variable is an indicator for purchase within a category. Price is measured in dollars per ounce, and inventory in ounces. All regressions include individual fixed effects, and standard errors are clustered at the individual level. *, **, and *** indicate at the 10%, 5%, and 1% levels, respectively.

Table 9: Regression of Purchase Indicator on Price and BMI, Non-Tempting Categories

	Fr. Vegetables		Pasta		Cereal		Salad		Milk	
Regressor	(1)	(2)	(1)	(2)	(1)	(2)	(1)	(2)	(1)	(2)
BMI	0.0029*	-0.0008	0.0009	0.0006	0.0015**	0.0004	0.0004	0.0003	0.0005	0.0010
	(0.0015)	(0.0009)	(0.0009)	(0.0004)	(0.0008)	(0.0006)	(0.0007)	(0.0006)	(0.0033)	(0.0011)
Inventory	-0.0206	-0.0236	0.0378	0.0380	0.0772*	0.0770*	-0.0124	-0.0134	-0.0191	-0.0190
	(0.0411)	(0.0411)	(0.0616)	(0.0619)	(0.0465)	(0.0466)	(0.0484)	(0.0483)	(0.0153)	(0.0152)
BMI × Inventory	-0.0025*	-0.0025*	-0.0053**	-0.0053**	-0.0049***	-0.0049***	-0.0022	-0.0021	0.0004	0.0004
	(0.0014)	(0.0014)	(0.0021)	(0.0021)	(0.0014)	(0.0014)	(0.0021)	(0.0021)	(0.0005)	(0.0005)
log (Price)	-0.0513**	-	-0.0392***	-	-0.1087***	-	-0.0496***	-	-0.0463	-
	(0.0235)		(0.0114)		(0.0161)		(0.0171)		(0.0286)	
log (Price) × BMI	0.0012	-	0.0002	-	0.0006	-	0.0002	-	-0.0002	-
	(0.0008)		(0.0004)		(0.0005)		(0.0006)		(0.0009)	
Price	-	-0.2020	-	-0.2011	-	-0.3721***	-	-0.1475**	-	-0.8631
		(0.1866)		(0.1219)		(0.0586)		(0.0583)		(0.8006)
Deal	-	0.0591***	-	0.0238***	-	0.0211	-	0.0260**	-	0.0191
		(0.0152)		(0.0063)		(0.0156)		(0.0132)		(0.0163)
Price × BMI	-	0.0096	-	-0.0012	-	0.0023	-	-0.0002	-	-0.0028
		(0.0060)		(0.0039)		(0.0018)		(0.0019)		(0.0266)
Deal × BMI	-	-0.0000	-	-0.0003	-	-0.0007	-	-0.0001	-	0.0006
		(0.0005)		(0.0002)		(0.0005)		(0.0004)		(0.0005)
Constant	-0.0412	0.0697**	-0.0707***	0.0337**	-0.0966***	0.1416***	0.0156	0.1108***	-0.0308	0.1519***
	(0.0471)	(0.0287)	(0.0274)	(0.0133)	(0.0241)	(0.0185)	(0.0219)	(0.0198)	(0.0987)	(0.0345)
N	177699	177699	204477	204477	238619	238619	169700	169700	266532	266532

Notes: An observation in this regression an individual shopping trip occurring between Oct 1st and Dec 31st. The dependent variable is an indicator for purchase within a category. Price is measured in dollars per ounce, and inventory in ounces. All regressions include individual fixed effects, and standard errors are clustered at the individual level. *, **, and *** indicate at the 10%, 5%, and 1% levels, respectively.

4 Policy Implication

In this section we demonstrate the importance of our empirical results through a simple policy analysis. We assess the impact of a 10% price increase on all of the four tempting product categories on both the volume purchased across obesity levels, as well as the impact on the population distribution of BMI. We choose a price increase of 10% per ounce because that roughly correlates to the size of the tax consumers have faced on sugary drinks (Emily - flesh this out: we found out the that the Pittsburgh tax was about 1.5 cents per ounce and this looked like a 20% tax on a standard 24 pack of Coke (from Walmart website). We then found literature suggesting about half the tax was passed on to consumers.). First, to predict the impact of the tax on overall volume purchased, we run the regression specification in equation (1) using volume purchased (including 0) as the dependent variable (NOTE: we need to add this table to the appendix). In Table 10, we show for each category and BMI bracket the change in volume purchased per trip as a result of a 10% price increase as well as the overall average volume purchased. It can be seen that there are substantial differences in the effect of the price change across BMI brackets, and that the price increase leads to substantial decreases in volume purchase for 3 of the 4 categories - on the order of 20 to 30 percent.

To quantify the impact of a tax that would result in a 10% price increase on obesity rates, we employ the results from the regression in Table 7. We compute the percentage decrease in category level consumption for each category and BMI bracket. Then, we take every individual in the data, and compute the change in weight that would result at the end of the first year they enter the data if their consumption were to drop by the amount we predict. We show the before and after distributions in Table 11. Such a tax would result in a reduction of the fraction of individuals who are obese by about 0.75% (EMILY: I think this is close to the yearly growth rate in obesity so I think this number is significant). In Table 12, we compute the fraction of individuals in each BMI bracket who drop one bracket. Interestingly the largest change is for overweight individuals, but we see substantial decreases across all brackets.

5 Interpretation/Theory

Courtemanche et al. (2014) provide suggestive evidence that individuals who are more obese have lower discount factors, and are more present-biased. They also find that weight is more sensitive to price changes for individuals who have the lowest measured discount factors. They show that these findings are consistent with a theoretical model based on O'Donoghue and Rabin (1999) and DellaVigna and Malmendier (2004), where individuals consider the

Table 10: Effect of 10% Price Increase on Purchase Volume

Bmi Bracket	Ice Cream	Dessert	Chocolate	Snacks
Underweight	-0.3326, 2.2484	0.0145, 1.1863	-0.2896, 0.9951	-0.2401, 1.1123
Healthy	-0.3652, 1.5805	-0.0054, 1.0378	-0.3017, 0.8226	-0.2557, 1.1683
Overweight	-0.3942, 1.9855	-0.0230, 1.2442	-0.3124, 0.9217	-0.2695, 1.3225
Obese	-0.4335, 1.9702	-0.0470, 1.3546	-0.3269, 1.0747	-0.2883, 1.4878
Extreme Obese	-0.5065, 2.4800	-0.0914, 1.6538	-0.3540, 1.3091	-0.3232, 1.8797

Notes: First number is the predicted change in volume purchased from a 10% price increase, while the second shows the overall average volume purchased per trip in the category.

Table 11: Effect of 10% Price Increase on Population Distribution of BMI, after 1 year

Bmi Bracket	Beginning of Year BMI	End of Year BMI
Underweight	1.82	1.93
Healthy	27.22	27.95
Overweight	31.30	31.08
Obese	29.72	29.25
Extreme Obese	9.94	9.79

Table 12: Percentage of Individuals who Drop one BMI Bracket after a 10% Price Increase

Bmi Bracket	Percent who Drop One Bracket
Healthy	0.40
Overweight	2.66
Obese	2.08
Extreme Obese	1.55

impact of current consumption on future weight. In particular, individuals with lower discount factors (or more present biased individuals) would also be more price sensitive in that model. If obesity is in fact correlated with myopia, it should be the case that the purchase patterns of obese individuals are consistent with myopia across a broad range of food categories. One particular type of purchase behavior that is a function of how forward-looking individuals are is consumer stockpiling behavior: Forward-looking individuals should stockpile in response to price promotions for storable goods. Hendel and Nevo (2006) develop a series of reduced-form tests for the strength of stockpiling behavior: in particular, if consumers are forward-looking, they will purchase larger quantities in response to deals, and will be sensitive to changes in inventory (as inventory drops, purchase will become more likely). If obese individuals are more myopic than non-obese individuals, they should be systematically less likely to stockpile in response to deals, and less sensitive to inventory changes. Our empirical findings do not provide support for these hypotheseses. In particular, we find that more obese individuals are not more likely to purchase on deal for storable goods (Table 6), and for non-tempting storable goods such as pasta or cereal, we find that being obese has either no effect or a negative effect suggesting obese individuals may be slightly more responsive to inventory changes (Table 9). As a result, a richer theory than simple myopia is necessary to explain our empirical findings.

A different candidate theory that is consistent with our empirical results is self-control. To show this, we develop a model of consumption and self-control that is based on that of Gul and Pesendorfer (2001, 2004). Note that the Gul and Pesendorfer (2001) model nests that of DellaVigna and Malmendier 2004, 2006 (Toussaert, 2018) so it is a more general than the framework used by Courtemanche et al. (2014), and in particular it can explain why forward-looking behavior does not vary with BMI in non-tempting categories, but price elasticities do vary with BMI in tempting categories. The idea behind how the model works is that for products that are tempting, individuals need to exert self-control in order to reduce consumption within the category. Self-control is captured by a utility cost that measures the disutility between consuming as much as possible of a product and what optimizes current and future utility. For non-tempting categories, self-control is not an issue. Our empirical findings suggest that individuals who have higher BMI find it more costly to exert self-control.

It is also notable that although Courtemanche et al. (2014) find a negative relationship between discount factors and BMI, this finding is consistent with the self-control theory we just outlined. In particular, the discount factor measured by Courtemanche et al. (2014) might actually be a proxy for an individual's cost of self-control (the idea that the discount factor may capture other behavioral biases has also been put forth in Frederick et al. (2002)). Their measure of the discount factor is derived from a survey question that asks individuals to make tradeoffs between current and future money. Individuals with greater self-control problems will prefer the option of receiving money today. As a result, even if individuals all have similar underlying discount factors, individuals with higher self-control costs will appear more myopic.

5.1 Baseline Theoretical Model

In our baseline model, we assume that individuals make consumption decisions over two periods, $t = 1, 2$. In period 1, the individual has the option to purchase a package of the product, or not to buy. We denote the individual's purchase decision as $x_1 \in \{0, 1\}$. The individual also makes a consumption decision in each period. We denote consumption as c_t. The individual has no inventory at the beginning of period 1, and whatever is not consumed in period 1 is saved for period 2 consumption. The consumer's utility maximization problem can be written as follows:

$$\max_{\{x_1 \in \{0,1\}, c_1\}} u(c_1) + k(v(c_1) - v(x_1)) - p_1 x_1 + \epsilon \mathbf{1}\{x_1 = 1\} + \delta H(x_1 - c_1). \tag{2}$$

Following Gul and Pesendorfer (2001), the household's flow utility in period 1 has two components. The first, $u(c_1)$, is called the *commitment utility*, and this represents the utility the individual receives from consuming c_1. The function $kv(c_1)$ is called the *temptation utility*, and will capture the impact of self-control and individual's urges. We assume that $u' > 0$, $u'' < 0$, $v' > 0$, $v'' > 0$, and $u'' + kv'' < 0$.[11] An individual is tempted to consume as much as possible in order to maximize their temptation utility. In this case, that would amount to consuming x_1. The individual has to exert self-control in order to avoid consuming as much as possible, and we specify the cost of exerting self-control as $k(v(x_1) - v(c_1))$. Note that since the cost of exerting self-control is positive, the presence of tempation always lowers the individual's utility. The parameter k allows us to scale the cost of exerting self-control up or down: the higher is k, the more effort the individual has to exert in order to avoid temptation.[12] We will denote k as the self-control parameter, and show our empirical findings are consistent with higher BMI individuals having higher values of k.

The variable p_1 is the price of a package of the product, and the variable ϵ is a choice-specific error, which represents the cost of using or obtaining the product in period 1. We assume that $\epsilon \sim F(\epsilon)$ where $f = F'(\epsilon) > 0$ and that f is symmetric with mean zero. The term $\delta \in [0, 1)$ is the individual's discount factor, and $H(\cdot)$ represents the individual's utility

[11] Gul and Pesendorfer (2001) make the same assumptions about the shape and derivative of the flow utility functions. These assumptions imply that the temptation utility is risk neutral or risk loving and the commitment utility is risk neutral or risk averse. The assumptions also ensure that the maximization problems have concave objective functions and that temptation does not lead to risk loving behavior.

[12] We assume that k is sufficiently low that the inequality $u'' + kv'' < 0$ holds.

from period 2 consumption. We assume that $H' > 0$, and $H'' < 0$, and that period 2 consumption, c_2, is equal to $x_1 - c_1$. Note that when the individual decides on period 1 consumption, she is trading off increasing current commitment and temptation utility today with having less to consume in the future. In the baseline version of the model, we abstract away from future purchase decisions for simplicity. Our assumptions on the derivatives of H will imply a single optimal value of c. In a more general formulation of the model, we could assume that an individual starts with some level of inventory, and that H could capture the present discounted future utility over a longer time horizon. Higher inventories might generate future disutility by increasing an individual's self-control cost, which would make the sign of H' negative. Our assumptions are consistent with individuals keeping inventory sufficiently low that this does not occur.

We now turn to the solution to the individual's decision problem in Equation (2). Given $x_1 = 1$, the optimal level of consumption in period 1 will satisfy the following equation:

$$u'(c_1^*) + kv'(c_1^*) - \delta H'(1 - c_1^*) = 0. \tag{3}$$

Implicitly differentiating the above equation with respect to p_1 implies that $\frac{\partial c_1^*}{\partial p_1} = 0$, suggesting that a individual's consumption decision is not directly affected by the purchase price.[13] The total utility she gets from making a purchase and consuming c_1^* is $u(c_1^*) + k(v(c_1^*) - v(1)) - p + \delta H(1 - c_1^*)$. On the other hand, if the individual chooses not to make a purchase in period 1, she cannot consume in either period: In this case her present discount utility is $u(0) + \delta H(0)$.

Hence, she will choose to purchase the product/good if and only if the following condition is satisfied:

$$u(c_1^*) + k(v(c_1^*) - v(1)) - p_1 + \epsilon + \delta H(1 - c_1^*) \geq u(0) + \delta H(0).$$

Given the optimal level of consumption c_1^*, the individual's choice probability can be derived in terms of the CDF of ϵ as follows:

$$P(x_1 = 1) = 1 - F(u(0) + \delta H(0) - u(c_1^*) - k(v(c_1^*) - v(1)) + p_1 - \delta H(1 - c_1^*)). \tag{4}$$

The derivatives of the purchase probability with respect to the price and the self-control

[13] The derivative of c^* with respect to p_1 would not be zero if price entered H, which could happen if prices are serially correlated over time and H represents an individual's value function. We assume for simplicity individuals view prices as i.i.d.

parameter k can be derived as follows:

$$\begin{aligned}\frac{\partial P(x_1=1)}{\partial p_1} &= -f(u(0)+\delta H(0)-u(c_1^*)-k(v(c_1^*)-v(1))+p_1 \\ &\quad -\delta H(1-c_1^*))<0, \end{aligned} \tag{5}$$

$$\begin{aligned}\frac{\partial P(x_1=1)}{\partial k} &= f(u(0)+\delta H(0)-u(c_1^*)-k(v(c_1^*)-v(1))+p_1 \\ &\quad -\delta H(1-c_1^*))(v(c_1^*)-v(1))<0. \end{aligned} \tag{6}$$

It is notable that the derivative of the purchase probability with respect to k is negative, suggesting that higher BMI individuals should be overall less likely to make purchases of unhealthy products (controlling for prices). This is consistent with our regression results in Table 8. Note that the sign of the derivative of the choice probability with respect to k depends on when the self-control cost is incurred: at the point of purchase or later on. Since the products under examination are typically consumed at home, we assume that the self-control cost would be incurred after the point-of-purchase - when the consumer takes the product home post-purchase. Importantly, this means that no self-control cost is incurred if no purchase happens. In Section 5.3, we argue that for products that are often consumed at the point-of-purchase, such as candy offered at the checkout counter, it is more likely that the self-control cost is incurred immediately, i.e., when no purchase occurs. In this case, larger values of k increase the purchase likelihood.

In our regression results, we also find that higher BMI individuals are more price sensitive, which is also consistent with our theory. To show that an individual's price elasticity can rise as k increases, we can take the cross partial derivative of the purchase probability with respect to p_1 and k:

$$\frac{\partial^2 P(x_1=1)}{\partial p_1 \partial k} = f'(u(0)+\delta H(0)-u(c_1^*)-k(v(c_1^*)-v(1))+p_1-\delta H(1-c_1^*))(v(c_1^*)-v(1)). \tag{7}$$

Equation (7) will be negative if f' is positive. This will occur under our shape assumptions on the error density if the choice probability is smaller than 0.5, which is the case for the products we examine. We note that our symmetry assumption on f will be satisfied by the error distributions that are commonly used in empirical models.

5.2 Extension: Model with Weight

One drawback to the model we presented above is that if the category under examination is perishable (i.e., it cannot be stored for future consumption), then individuals will always consume what they purchase and never incur a cost of self-control. In particular, the derivative of the purchase probability with respect to k in the equation (6) will be zero. However, in reality individuals probably do incur self-control costs for perishable goods. One way to incorporate this is to allow consumption to affect an individual's future weight. In particular, suppose for simplicity that the product under consideration is not storable (any inventory of the product that is not consumed in period t disappears in period $t+1$), but consumption of it affects an individual's weight at the beginning of the following period, w_{t+1} in the following way:

$$w_{t+1} = h(c_t) + \beta w_t, \tag{8}$$

where $h(\cdot)$ is increasing in consumption. Then, the household's problem can be written as

$$\max_{\{x_1 \in \{0,1\}, c_1\}} u(c_1, w_1) + k(v(c_1) - v(x_1)) - p_1 x_1 + \epsilon \mathbf{1}\{x_1 = 1\} + \delta H(h(c_1) + \beta w_1), \tag{9}$$

where we assume that $u_w < 0$, and $H' < 0$. It is easy to show that the solution to the consumer's problem (9) will have the same properties as that derived in the previous section. One interesting implication of the model above is that an individual may purchase a package of a product but not consume all of it. We note that it is important here that the product is only available in fixed package sizes (i.e., the choice variable x is not continuous). If x were continuous an individual would never purchase more than she would consume. The assumption of a fixed package size however is realistic and applies to all the tempting product categories we examine.

5.3 Other Alternative Explanations

In this section we explore three other alternative explanations, in addition to the explanation advanced by Courtemanche et al. (2014) which we discussed earlier. One alternative candidate theory behind the behavior of obese individuals is that these individuals do suffer from self-control issues, but simply prefer to eat unhealthy products. One could model this by assuming that $k = 0$, but that the flow utility from consumption, $u(\cdot)$, is higher for obese individuals. In particular, one could parameterize this by multiplying u by a parameter $\tau > 0$, where τ is larger for more obese individuals. One could write the household's maximization problem as follows:

$$\max_{\{x_1 \in \{0,1\}, c_1\}} \tau u(c_1) - p_1 x_1 + \epsilon \mathbf{1}\{x_1 = 1\} + \delta H(x_1 - c_1). \tag{10}$$

In this case, it is easy to show that the cross-partial derivative of the purchase probability with respect to τ and p_1 is positive, which is inconsistent with our empirical findings.

A second possible explanation of our finding that higher BMI individuals have more elastic demand than low BMI individuals is that higher BMI individuals are simply more price sensitive: For example, the marginal utility of income could be higher for these individuals because they are lower income or for other, unobservable reasons.[14] However, if this were true, we would find that higher BMI individuals were more price sensitive in non-tempting categories as well.

A third possible explanation for our finding related to the differences in price sensitivities across BMI brackets for tempting goods is that obese individuals underestimate the impact of consumption of these goods on their future weight. If this story is true, it would provide an avenue for policies that provide information. To show that this model can generate our theoretical results, we modify the model presented in Section 5.2 in the following way. We assume that $k = 0$, and we assume that an individual's perception of the impact of consumption on her future weight can be described with the following state transition:

$$w_{t+1} = \alpha h(c_t) + \beta w_t,$$

where $0 \leq \alpha \leq 1$ represents the extent to which a consumer underestimates the impact of consumption on weight gain. The consumer problem can we written as:

$$\max_{\{x_1 \in \{0,1\}, c_1\}} u(c_1, w_1) - p_1 x_1 + \epsilon \mathbf{1}\{x_1 = 1\} + \delta H(\alpha h(c_1) + \beta w_1). \tag{11}$$

It can be shown that the impact of α on c_1 is

$$\frac{\partial c_1}{\partial \alpha} = \frac{-\delta H'(\alpha h(c_1) + \beta w_1)}{u''(c_1) + \delta \alpha^2 H''(\alpha h(c_1) + \beta w_1) h'(c_1)[1 + h'(c_1)] + \delta \alpha H'(\alpha h(c_1) + \beta w_1) h''(c_1)}.$$

The above expression will be positive as long as $h''(c_1) < 0$. The cross-partial derivate of the purchase probability with respect to p_1 and α can be written as

$$\begin{aligned} \frac{\partial^2 P(x_1 = 1)}{\partial p_1 \partial \alpha} &= -f'(u(0) + \delta H(0) - u(c_1^*) + p_1 - \delta H(\alpha h(c_1^*) + \beta w_1)(u'(c_1^*) \frac{\partial c_1}{\partial \alpha} \\ &\quad + \delta H'(\alpha h(c_1^*) + \beta w_1)(1 + h'(c_1^*))). \end{aligned}$$

The cross-partial derivative above will be negative if f' is positive and $\frac{\partial c_1}{\partial \alpha} > 0$.

[14] In our model, we could parameterize this by multiplying the price by a price coefficient α, which is higher for higher BMI individuals.

To rule out this third explanation, we appeal to two of our empirical findings. First, in supplementary analysis we run the regression in equation (1) with additional controls where we interact variables that should proxy for an individual's information with price, and the interaction between bmi and price. We explore four different proxy variables: whether an individual has been diagnosed with an obesity-related disease (high cholesterol, type 2 diabetes, a heart attack, or other heart problems), whether an individual is concerned about her weight, whether an individual views obesity as a disease (in Table 3, whether an individual responds he/she suffers from obesity or is treating it), and whether an individual's weight description in Table 3 is inconsistent with the individual's weight (the individual is obese and answers he/she is slightly overweight or about right). Appendix Table 22 shows the cross-tabulation between obesity-related diseases and bmi bracket. The obesity-related disease results are shown in Appendix Tables 33 and 34 (the dummy variable indicates the individual has an obesity related disease - in the survey the individual answers she suffers from the disease, or is treating it), and suggest no systematic interaction between price and having the disease. Intuitively, individuals who are diagnosed with an obesity-related disease are likely to have been informed by their doctor about lifestyle changes aimed at mitigating the disease (i.e., physical activity, healthy eating, etc), and if better information had an effect one would expect the interaction between price and having the condition to be positive. Individuals who are concerned about their weight also show no difference in price sensitivity (Appendix Tables 35 and 36); again, such individuals should be more likely to have information about how to mitigate obesity. Individuals who understand that obesity is a disease condition also do not behave differently (in terms of price response) than those who do not (Appendix Tables 37 and 38). Finally, individuals who perceive their weight condition to be better than it is should exhibit more price sensitivity than those who do not, since they seem to be less aware of their obesity status (Appendix Tables 39 and 40). Taken together, the insignificance of interactions related to information about obesity indicate that information does not seem to be playing a strong role; it is notable however that the interactions between BMI and prices or deals still suggest that higher BMI individuals are more price sensitive.

Second, we find that obese individuals are more likely to purchase checkout products than non-obese individuals, including products that have no effect on weight such as gossip magazines. As we described in Section 5.1, this behavior is consistent with obese individuals having higher self-control costs if self-control costs are incurred at the time of purchase, rather than later on. This is more likely to be the case with checkout products that can be consumed immediately than non-checkout products.[15]

[15] We can model the individuals' decision in this case as a decision to either purchase and consume the product or not. The individual will maximize $u(x) + k(v(x) - v(1)) + (-p_1 + \epsilon)\mathbf{1}\{x = 1\}$ over $x = \in \{0, 1\}$. It is easy to show in

6 Discussion

In this paper, we document how purchase behavior varies with BMI, and provide evidence that obesity is at least partially due to self-control problems. To conduct our analysis we make use of unique data that links obesity to observed purchase behavior. Our results suggest that interventions such as reducing choice sets through bans on checkout candy, or taxes on junk food, may be effective.

In future work, it would be insightful to quantify the impact of junk food taxes on obesity. It is notable that up to the present, taxes that aim to combat obesity have focused on soda and sugary drinks. It is notable that in our empirical work, we find that obese individuals seem to be spending less on such products, which may explain why the effectiveness of such taxes seems to have been limited. Our finding that obese individuals are more price sensitive in unhealthy food categories suggests that taxes in these categories may be effective instruments. To effectively quantify the impact of such taxes, it would be necessary to estimate a category-level demand model that captures substitution patterns across these categories.

this case that the purchase probability increases in k.

References

Avena, N., Bocarsly, M., and Hoebel, B. (2012). Animal models of sugar and fat bingeing: Relationship to food addiction and increased body weight. *Psychiatric Disorders. Methods in Molecular Biology*, 829:351–365.

Avena, N., Rada, P., and Hoebel, B. (2008). Evidence for sugar addiction: Behavioral and neurochemical effects of intermittent, excessive sugar intake. *Neuroscience & Biobehavioral Reviews*, 32:20–39.

Borghans, L. and Golsteyn, B. (2006). Time discounting and the body mass index: evidence from the netherlands. *Economics and Human Biology*, 4:29–61.

Bronnenberg, B. J., Dub, J.-P. H., and Gentzkow, M. (2012). The evolution of brand preferences: Evidence from consumer migration. *American Economic Review*, 102(6):2472–2508.

Bronnenberg, B. J., Kruger, M. W., and Mela, C. F. (2008). Database paperthe iri marketing data set. *Marketing Science*, 27(4):745–748.

Cawley, J. and Frisvold, D. (2017). The pass-through of taxes on sugar-sweetened beverages to retail prices: The case of berkeley, california. *Journal of Policy Analysis and Management*, 36:303326.

Cawley, J. and Meyerhoefer, C. (2012). The medical care costs of obesity: an instrumental variables approach. *Journal of Health Economics*, 31:219–230.

Center for Disease Control (2015). Adult obesity facts. page https://www.cdc.gov/obesity/data/adult.html.

Cohen, D. A. and Babey, S. H. (2012). Candy at the cash register a risk factor for obesity and chronic disease. *New England Journal of Medicine*, 367(15):1381–1383. PMID: 23050524.

Courtemanche, C., Heutel, G., and McAlvanah, P. (2014). Impatience, incentives and obesity. *The Economic Journal*, 125:1–31.

Debnam, J. (2017). Selection effects and heterogeneous demand responses to the berkeley soda tax vote. *American Journal of Agricultural Economics*, 99(5):1172–1187.

DellaVigna, S. and Malmendier, U. (2004). Contract design and self-control: Theory and evidence. *Quarterly Journal of Economics*, 119:353–402.

DellaVigna, S. and Malmendier, U. (2006). Paying not to go to the gym. *American Economic Review*, 96:694–719.

Diehr, P., OMeara, E., Fitzpatrick, A., Newman, A., Kuller, L., and Burke, G. (2008). Weight, mortality, years of healthy life, an active life expectancy in older adults. *Journal of the American Geriatrics Society*, 56:76–83.

Dubois, P., Griffith, R., and Nevo, A. (2014). Do prices and attributes explain international differences in food purchases? *American Economic Review*, 104(3):832–67.

Dubois, P., Griffith, R., and OConnell, M. (2018). The effects of banning advertising in junk food markets. *The Review of Economic Studies*, 85(1):396–436.

Elbel, B., Kersh, R., Brescholl, V., and Dixon, L. (2009). Calorie labeling and good choices: a first look at the effects on low-income people in new york city. *Health Affairs*, 28:1110–1121.

Falbe, J., Thompson, H., Becker, C., Rojas, N., McCulloch, C., and Madsen, K. (2015). Impact of the berkeley excise tax on sugar-sweetened beverage consumption. *American Journal of Public Health*, 106:1865–1871.

Fletcher, J. (2011). Soda taxes and substitution effects: will obesity be affected? *Choices*, 26.

Frederick, S., Loewenstein, G., and O'Donoghue, T. (2002). Time discounting and time preference: A critical review. *Journal of Economic Literature*, 40:351–401.

Gul, F. and Pesendorfer, W. (2001). Temptation and self-control. *Econometrica*, 69:1403–1435.

Gul, F. and Pesendorfer, W. (2004). Self-control and the theory of consumption. *Econometrica*, 72:119–158.

Hendel, I. and Nevo, A. (2006). Sales and consumer inventory. *The RAND Journal of Economics*, 37:543–561.

Hornik, R. (2002). Public health communications: Making sense of contradictory evidence.

Komlos, J., Smith, P., and Bogin, B. (2004). Obesity and the rate of time preference: is there a connection? *Journal of Biosocial Science*, 36:209–219.

NCD Risk Factor Collaboration (2016). Trends in adult body-mass index in 200 countries from 1975 to 2014: A pooled analysis of 1698 population-based measurement studies with 19.2 million participants. *Lancet*, 387:13771396.

O'Donoghue, T. and Rabin, M. (1999). Doing it now or later. *American Economic Review*, 89(1):103–124.

Ogden, C., Carroll, M., McDowell, M., and Fleal, K. (2007). Obesity among adults in the united states no statistically significant chance since 2003-2004. *NCHS Data Brief*, 1:1–8.

Oster, E. (Forthcoming). Diabetes and diet: Behavioral response and the value of health. *American Economic Journal: Applied Economics*.

Randolph, W. and Viswanath, K. (2004). Lessions learned from public health mass media campaigns: marketing health in crowed media world. *Annual Review of Public Health*, 25:419–437.

Rojas, C. and Wang, E. (2017). Do taxes for soda and sugary drinks work? scanner data evidence from berkeley and washington. *Mimeo*.

Silver, L., Ng, S. W., Ryan-Ibarra, S., Taillie, L. S., Induni, M., Miles, D., Poti, J., and 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*.

Smith, P., Bogin, B., and Bishai, D. (2005). Are time preference and body mass index associated? evidence from the national longitudinal survey of youth. *Economics and Human Biology*, 3:259270.

Taylor, R., Kaplan, S., Villas-Boas, S., and Jung, K. (2016). Soda wars: Effect of a soda tax election on soda purchases.

Toussaert, S. (2018). Eliciting temptation and self-control through menu choices: a lab experiment. *Econometrica*, 86:859–889.

Wang, E., Rojas, C., and Colantuoni, F. (2017). Heterogeneous behavior, obesity, and storability in the demand for soft drinks. *American Journal of Agricultural Economics*, 99(1):18–33.

Wang, E. Y. (2015). The impact of soda taxes on consumer welfare: implications of storability and taste heterogeneity. *The RAND Journal of Economics*, 46(2):409–441.

Zhang, L. and Rashad, I. (2008). Obesity and time preference: the health consequences of discounting the future. *Journal of Biosocial Science*, 40:97–113.

Table 13: Distribution of Household Size

Number of Members	Medprofiler Percent household-years
1	23.60
2	42.65
3	14.52
4	11.73
5+	7.50

Table 14: Distribution of household income (per person)

Income Level	Medprofiler Percent household-years	1 Person Medprofiler Percent household-years
$\leq \$15,000$	28.25	15.62
$\$15,000 - \$23,750$	22.12	18.22
$\$23,750 - \$42,500$	33.78	30.45
$> \$42,500$	15.85	35.71

7 Appendix Tables

Table 15: Distribution of Household Ethnicity

Income Level	Medprofiler Percent household-years	1 Person Medprofiler Percent household-years
White	81.51	81.87
Black	9.96	12.69
Asian	3.14	1.86
Other	5.39	3.59

Table 16: Distribution of Household Hispanic Origin

Income Level	Medprofiler Percent household-years	1 Person Medprofiler Percent household-years
Hispanic Origin	7.07	3.19
Non-Hispanic Origin	92.93	96.81

Table 17: Distribution of Gender (Person-Level)

Income Level	Medprofiler Percent household-years	1 Person Medprofiler Percent household-years
Male	47.36	28.31
Female	52.64	71.69

Table 18: Distribution of Household Education (Max of Male, Female Head)

Income Level	Medprofiler Percent household-years	1 Person Medprofiler Percent household-years
No High School	1.09	1.50
High School Graduate	15.37	16.92
Some College	30.10	31.20
College Graduate	36.41	33.33
Post Graduate	17.03	17.05

Table 19: Distribution of Age (Person-Level)

Income Level	Medprofiler Percent household-years	1 Person Medprofiler Percent household-years
≤ 30	17.21	15.61
$31 - 40$	14.64	8.88
$41 - 50$	17.43	10.94
$51 - 65$	31.73	36.67
> 65	19.00	27.91

Table 20: Answers to Health-Related Questions

I don't feel I'm doing enough to stay healthy					
	Underweight	Healthy	Overweight	Obese	Extreme Obese
Agree	22.28	18.84	25.25	39.49	54.95
Neutral	31.80	30.91	34.90	35.08	28.71
Disagree	45.92	50.25	39.85	25.43	16.34
I'm much healthier than most people my age					
	Underweight	Healthy	Overweight	Obese	Extreme Obese
Agree	49.70	59.84	50.82	32.29	14.20
Neutral	36.29	32.86	38.92	46.02	40.67
Disagree	14.01	7.30	10.26	21.70	45.13
Exercise is an important part of my life					
	Underweight	Healthy	Overweight	Obese	Extremely Obese
Agree	52.40	57.49	46.69	32.76	21.05
Neutral	29.92	29.56	35.25	39.27	36.04
Disagree	17.68	12.95	18.06	27.98	42.91
I often read nutritional labels on food					
	Underweight	Healthy	Overweight	Obese	Extreme Obese
Agree	69.10	70.01	66.81	65.54	63.18
Neutral	16.92	17.15	18.45	18.85	19.88
Disagree	14.61	12.84	14.74	15.61	16.94

Table 21: Eating/Exercise Habits

How Often Do you Eat Dessert/Indulgent Snacks					
	Underweight	Healthy	Overweight	Obese	Extremely Obese
Most Days	23.60	20.49	18.58	19.55	19.27
Some Days	45.68	50.49	54.22	55.04	56.35
Rarely/Never	30.72	29.02	27.20	25.41	24.38
How Often Do you Eat Fast Food					
	Underweight	Healthy	Overweight	Obese	Extremely Obese
Most Days	2.64	2.02	2.51	3.73	6.13
Some Days	28.56	28.99	36.23	42.60	48.49
Rarely/Never	68.80	68.99	61.26	53.67	45.38
Exercise/Active for at least 20 minutes per day					
	Underweight	Healthy	Overweight	Obese	Extremely Obese
Most Days	48.32	50.22	39.27	26.96	15.92
Some Days	29.60	32.91	38.49	40.22	35.61
Rarely/Never	22.08	16.87	22.24	32.83	48.47

Table 22: Obesity-Related Diseases

Heart Attack					
	Underweight	Healthy	Overweight	Obese	Extremely Obese
Rx Only	1.12	1.16	1.77	2.24	2.04
OTC Only	0.24	0.28	0.39	0.31	0.36
Dual	0.32	0.42	0.42	0.55	0.64
Suffer, do no treat	0.24	0.15	0.19	0.28	0.25
Non-sufferer	98.08	97.99	97.23	96.62	96.70
Heart Problems					
	Underweight	Healthy	Overweight	Obese	Extremely Obese
Rx Only	5.52	6.31	7.59	8.78	9.71
OTC Only	0.72	0.61	0.65	0.53	0.55
Dual	1.52	1.06	1.45	1.78	1.82
Suffer, do no treat	1.04	0.62	0.63	0.89	1.01
Non-sufferer	91.21	91.40	89.68	88.02	86.90
High Cholesterol					
	Underweight	Healthy	Overweight	Obese	Extremely Obese
Rx Only	12.63	17.90	28.30	33.68	35.82
OTC Only	3.36	3.00	3.29	2.86	2.19
Dual	1.52	2.13	3.20	3.60	3.67
Suffer, do no treat	3.92	3.55	4.43	4.56	4.15
Non-sufferer	78.58	73.42	60.79	55.30	54.17
Type 2 diabetes					
	Underweight	Healthy	Overweight	Obese	Extremely Obese
Rx Only	1.68	3.08	7.21	14.88	24.64
OTC Only	0.24	0.29	0.46	0.50	0.51
Dual	0.32	0.35	1.07	2.13	2.85
Suffer, do no treat	0.48	0.57	0.95	1.48	1.60
Non-sufferer	97.28	95.71	90.31	81.02	70.41

Table 23: Are you on a low calorie/carb/fat/sugar diet?

	Underweight	Healthy	Overweight	Obese	Extremely Obese
No	65.79	61.20	55.01	48.78	44.19
Yes	34.21	38.80	44.99	51.22	55.81

Table 24: Is Respondent on a Diet Given Weight Concern?

	Concern Level		
	Very Concerned	Somewhat Concerned	Not at All
No	39.51	56.91	70.06
Yes	60.49	43.09	29.94

Table 25: Regression of Probability of Buying on Deal on Characteristics (Obese Dummy)

Regressor	(1)	(2)	(3)
Unhealthy Category	0.0005	0.0130**	0.0326***
	(0.0056)	(0.0054)	(0.0038)
Storable Category	0.1501***	0.1528***	0.1338***
	(0.0049)	(0.0047)	(0.0031)
Obese	-0.0047	0.0018	0.0029
	(0.0058)	(0.0057)	(0.0027)
Unhealthy × Obese	0.0198**	0.0155*	-0.0020
	(0.0084)	(0.0082)	(0.0054)
Unhealthy × Storable	-0.0375***	-0.0441***	-0.0589***
	(0.0069)	(0.0067)	(0.0046)
Storable × Obese	-0.0115	-0.0112	-0.0008
	(0.0072)	(0.0070)	(0.0045)
Unhealthy × Storable × Obese	-0.0114	-0.0091	0.0001
	(0.0104)	(0.0101)	(0.0065)
Constant	0.2167***	-	0.2167***
	(0.0038)		(0.0013)

Notes: An observation in this regression is a purchase event of a particular product (UPC). The dummy variable obese is 1 if an individual's BMI bracket is obese or extremely obese. Unhealthy categories are defined as bakery desserts, cookies, ice cream, salty snacks, regular soda, and candy. Neutral/healthy categories are fresh fruits and vegetables, yogurt, milk, eggs, bread, frozen vegetables, cereals, pasta, and diet soda. We define the following categories as storable: ice cream, salty snacks, packaged cookies, candy, frozen vegetables, cereal, pasta, and soda. Specification (1) includes no additional controls, while (2) includes income, employment, occupation, ethnicity, hispanic origin, gender, and age dummy variables. Specification (3) includes household fixed effects. Standard errors are clustered at the individual level. *, **, and *** indicate at the 10%, 5%, and 1% levels, respectively.

Table 26: Regression of Probability of Buying on Deal on Characteristics (BMI Bracket)

Regressor	(1)	(2)	(3)
Unhealthy Category	0.0012	0.0138*	0.0301***
	(0.0076)	(0.0072)	(0.0053)
Storable Category	0.1500***	0.1527***	0.1309***
	(0.0059)	(0.0057)	(0.0038)
Overweight	-0.0134**	-0.0100	-2.952e-05
	(0.0065)	(0.0063)	(0.0025)
Obese	-0.0158**	-0.0075	0.0017
	(0.0069)	(0.0068)	(0.0027)
Extreme Obese	-0.0108	0.0015	0.0019
	(0.0096)	(0.0095)	(0.0037)
Unhealthy × Overweight	0.0027	0.0014	0.0035
	(0.0096)	(0.0093)	(0.0068)
Unhealthy × Obese	0.0203**	0.0159	0.0021
	(0.0103)	(0.0099)	(0.0068)
Unhealthy × Extreme Obese	0.0157	0.0112	-0.0040
	(0.0129)	(0.0125)	(0.0085)
Unhealthy × Storable	-0.0299***	-0.0368***	-0.0471***
	(0.0091)	(0.0087)	(0.0060)
Storable × Overweight	0.0014	0.0006	0.0067
	(0.0080)	(0.0079)	(0.0052)
Storable × Obese	-0.0091	-0.0093	0.0035
	(0.0084)	(0.0082)	(0.0052)
Storable × Extreme Obese	-0.0175	-0.0169	-0.0003
	(0.0113)	(0.0110)	(0.0072)
Unhealthy × Storable × Overweight	-0.0103	-0.0092	-0.0192**
	(0.0120)	(0.0116)	(0.0082)
Unhealthy × Storable × Obese	-0.0238*	-0.0202*	-0.0144*
	(0.0126)	(0.0122)	(0.0081)
Unhealthy × Storable × Extreme Obese	-0.0067	-0.0057	-0.0044
	(0.0163)	(0.0158)	(0.0099)
Constant	0.2265***	-	0.2204***
	(0.0049)		(0.0016)

Notes: An observation in this regression is a purchase event of a particular product (UPC). Unhealthy categories are defined as bakery desserts, cookies, ice cream, salty snacks, regular soda, and candy. Neutral/healthy categories are fresh fruits and vegetables, yogurt, milk, eggs, bread, frozen vegetables, cereals, pasta, and diet soda. We define the following categories as storable: ice cream, salty snacks, packaged cookies, candy, frozen vegetables, cereal, pasta, and soda. Specification (1) includes no additional controls, while (2) includes income, employment, occupation, ethnicity, hispanic origin, gender, and age dummy variables. Specification (3) includes household fixed effects. Standard errors are clustered at the individual level. *, **, and *** indicate at the 10%, 5%, and 1% levels, respectively.

Table 27: Regression of Purchase Indicator on Price and BMI, Tempting Categories (7 month window)

	Ice Cream		Desserts		Chocolate		Snacks	
Regressor	(1)	(2)	(1)	(2)	(1)	(2)	(1)	(2)
BMI	-0.0006	0.0005**	-0.0009	0.0007***	0.0005	-0.0007	-0.0008	0.0009*
	(0.0004)	(0.0002)	(0.0006)	(0.0002)	(0.0003)	(0.0005)	(0.0005)	(0.0005)
Inventory	-0.0613***	-0.0611***	-0.1030***	-0.1030***	-0.1194***	-0.1186***	-0.1698***	-0.1688***
	(0.0138)	(0.0137)	(0.0301)	(0.0301)	(0.0244)	(0.0242)	(0.0323)	(0.0322)
BMI × Inventory	0.0008**	0.0008**	0.0000	0.0000	0.0009	0.0008	0.0010	0.0010
	(0.0004)	(0.0004)	(0.0009)	(0.0009)	(0.0008)	(0.0008)	(0.0010)	(0.0010)
log (Price)	-0.0458***	-	0.0104	-	-0.0769***	-	-0.1205***	-
	(0.0059)		(0.0088)		(0.0110)		(0.0126)	
log (Price) × BMI	-0.0004**	-	-0.0007**	-	0.0000	-	-0.0007*	-
	(0.0002)		(0.0003)		(0.0004)		(0.0004)	
Price	-	-0.3335***	-	0.0263	-	-0.1417***	-	-0.3489***
		(0.0456)		(0.0342)		(0.0262)		(0.0402)
Deal	-	0.0175**	-	0.0085	-	0.0382***	-	-0.0053
		(0.0068)		(0.0067)		(0.0095)		(0.0085)
Price × BMI	-	-0.0028*	-	-0.0018	-	0.0017*	-	-0.0026*
		(0.0014)		(0.0012)		(0.0009)		(0.0014)
Deal × BMI	-	0.0006**	-	0.0001	-	0.0012***	-	-0.0003
		(0.0002)		(0.0002)		(0.0003)		(0.0003)
Constant	-0.0537***	0.0797***	0.1227***	0.0977***	0.0386***	0.1526***	0.0063	0.2594***
	(0.0132)	(0.0064)	(0.0167)	(0.0061)	(0.0095)	(0.0131)	(0.0146)	(0.0147)
N	370973	370973	332594	332594	414226	414226	406944	406944

Notes: An observation in this regression an individual shopping trip occurring between Aug 1st and Feb 28th of the following year. The dependent variable is an indicator for purchase within a category. Price is measured in dollars per ounce, and inventory in ounces. All regressions include individual fixed effects, and standard errors are clustered at the individual level. *, **, and *** indicate at the 10%, 5%, and 1% levels, respectively.

Table 28: Regression of Purchase Indicator on Price and BMI, Non-Tempting Categories (7 month window)

	Fr. Vegetables		Pasta		Cereal		Salad	
Regressor	(1)	(2)	(1)	(2)	(1)	(2)	(1)	(2)
BMI	-0.0001	-0.0002	0.0000	-0.0004	0.0007*	-0.0004	0.0002	-0.0002
	(0.0008)	(0.0005)	(0.0005)	(0.0003)	(0.0004)	(0.0003)	(0.0004)	(0.0004)
Inventory	-0.0404	-0.0416	-0.0058	-0.0055	0.0349	0.0348	-0.0274	-0.0274
	(0.0351)	(0.0350)	(0.0600)	(0.0601)	(0.0516)	(0.0518)	(0.0420)	(0.0419)
BMI × Inventory	-0.0019*	-0.0019*	-0.0043**	-0.0043**	-0.0036***	-0.0036***	-0.0018	-0.0018
	(0.0011)	(0.0011)	(0.0019)	(0.0019)	(0.0013)	(0.0013)	(0.0017)	(0.0017)
log (Price)	-0.0135	-	-0.0287***	-	-0.1080***	-	-0.0600***	-
	(0.0131)		(0.0061)		(0.0088)		(0.0103)	
log (Price) × BMI	-0.0000	-	0.0000	-	0.0005*	-	0.0003	-
	(0.0004)		(0.0002)		(0.0003)		(0.0003)	
Price	-	0.0243	-	-0.3202***	-	-0.3673***	-	-0.1669***
		(0.0988)		(0.0762)		(0.0323)		(0.0347)
Deal	-	0.0498***	-	0.0129***	-	0.0057	-	0.0384***
		(0.0088)		(0.0037)		(0.0090)		(0.0082)
Price × BMI	-	0.0007	-	0.0032	-	0.0018*	-	0.0002
		(0.0031)		(0.0025)		(0.0010)		(0.0011)
Deal × BMI	-	0.0001	-	0.0001	-	-0.0001	-	-0.0003
		(0.0003)		(0.0001)		(0.0003)		(0.0003)
Constant	0.0489*	0.0567***	-0.0310**	0.0626***	-0.0751***	0.1677***	0.0194	0.1285***
	(0.0261)	(0.0148)	(0.0146)	(0.0076)	(0.0132)	(0.0094)	(0.0128)	(0.0115)
N	294390	294390	337230	337230	393820	393820	279557	279557

Notes: An observation in this regression an individual shopping trip occurring between Aug 1st and Feb 28th of the following year. The dependent variable is an indicator for purchase within a category. Price is measured in dollars per ounce, and inventory in ounces. All regressions include individual fixed effects, and standard errors are clustered at the individual level. *, **, and *** indicate at the 10%, 5%, and 1% levels, respectively.

Table 29: Regression of Purchase Indicator on Price and Obese Dummy, Tempting Categories

	Ice Cream		Desserts		Chocolate		Snacks	
Regressor	(1)	(2)	(1)	(2)	(1)	(2)	(1)	(2)
Obese	-0.0282**	0.0112	-0.0450***	0.0103	-0.0117	-0.0227	-0.0266*	0.0186
	(0.0123)	(0.0072)	(0.0158)	(0.0080)	(0.0102)	(0.0159)	(0.0157)	(0.0161)
Inventory	-0.0412***	-0.0410***	-0.0778***	-0.0777***	-0.1116***	-0.1131***	-0.1630***	-0.1625***
	(0.0066)	(0.0066)	(0.0187)	(0.0187)	(0.0153)	(0.0153)	(0.0152)	(0.0151)
Obese × Inventory	0.0204*	0.0205**	-0.0241	-0.0242	0.0223	0.0237	0.0641***	0.0635***
	(0.0105)	(0.0104)	(0.0275)	(0.0275)	(0.0229)	(0.0227)	(0.0231)	(0.0231)
log (Price)	-0.0495***	-	-0.0018	-	-0.0594***	-	-0.1434***	-
	(0.0036)		(0.0050)		(0.0064)		(0.0083)	
log (Price) × Obese	-0.0132**	-	-0.0229***	-	-0.0117	-	-0.0193	-
	(0.0054)		(0.0080)		(0.0111)		(0.0131)	
Price	-	-0.3524***	-	0.0000	-	-0.0533***	-	-0.4329***
		(0.0284)		(0.0219)		(0.0165)		(0.0269)
Deal	-	0.0305***	-	0.0153***	-	0.0783***	-	-0.0166***
		(0.0042)		(0.0041)		(0.0069)		(0.0055)
Price × Obese	-	-0.0899**	-	-0.0779**	-	0.0171	-	-0.0659
		(0.0423)		(0.0328)		(0.0293)		(0.0422)
Deal × Obese	-	0.0016	-	-0.0058	-	0.0346***	-	-0.0054
		(0.0068)		(0.0069)		(0.0109)		(0.0089)
Constant	-0.0536***	0.0847***	0.1114***	0.1124***	0.0764***	0.1215***	-0.0206**	0.2890***
	(0.0080)	(0.0044)	(0.0094)	(0.0043)	(0.0058)	(0.0088)	(0.0096)	(0.0101)
N	225890	225890	200854	200854	252583	252583	246532	246532

Notes: An observation in this regression an individual shopping trip occurring between Oct 1st and Dec 31st. The dependent variable is an indicator for purchase within a category. Obese is a dummy variable if an individual is in the obese or extremely obese BMI bracket. Price is measured in dollars per ounce, and inventory in ounces. All regressions include individual fixed effects, and standard errors are clustered at the individual level. *, **, and *** indicate at the 10%, 5%, and 1% levels, respectively.

Table 30: Regression of Purchase Indicator on Price and Obese Dummy, Non-Tempting Categories

	Fr. Vegetables		Pasta		Cereal		Salad	
Regressor	(1)	(2)	(1)	(2)	(1)	(2)	(1)	(2)
Obese	0.0360	-0.0112	0.0080	0.0064	0.0249**	0.0010	0.0069	0.0082
	(0.0237)	(0.0142)	(0.0134)	(0.0063)	(0.0121)	(0.0092)	(0.0135)	(0.0135)
Inventory	-0.0822***	-0.0829***	-0.0808***	-0.0807***	-0.0366*	-0.0366*	-0.0680***	-0.0684***
	(0.0154)	(0.0154)	(0.0257)	(0.0258)	(0.0212)	(0.0212)	(0.0127)	(0.0127)
Obese × Inventory	-0.0309	-0.0306	-0.0759**	-0.0758**	-0.0576**	-0.0576**	-0.0046	-0.0041
	(0.0208)	(0.0209)	(0.0311)	(0.0311)	(0.0255)	(0.0255)	(0.0349)	(0.0349)
log (Price)	-0.0217***	-	-0.0338***	-	-0.0949***	-	-0.0452***	-
	(0.0076)		(0.0038)		(0.0054)		(0.0067)	
log (Price) × Obese	0.0146	-	0.0016	-	0.0129	-	0.0049	-
	(0.0116)		(0.0056)		(0.0080)		(0.0104)	
Price	-	0.0280	-	-0.2285***	-	-0.3197***	-	-0.1491***
		(0.0606)		(0.0400)		(0.0198)		(0.0241)
Deal	-	0.0572***	-	0.0165***	-	0.0030	-	0.0246***
		(0.0053)		(0.0021)		(0.0052)		(0.0047)
Price × Obese	-	0.1313	-	-0.0194	-	0.0377	-	-0.0141
		(0.0925)		(0.0582)		(0.0286)		(0.0390)
Deal × Obese	-	0.0018	-	-0.0011	-	-0.0095	-	-0.0078
		(0.0083)		(0.0034)		(0.0080)		(0.0075)
Constant	0.0300*	0.0520***	-0.0474***	0.0492***	-0.0611***	0.1523***	0.0253***	0.1171***
	(0.0154)	(0.0090)	(0.0091)	(0.0041)	(0.0082)	(0.0059)	(0.0082)	(0.0083)
N	177699	177699	204477	204477	238619	238619	169700	169700

Notes: An observation in this regression an individual shopping trip occurring between Oct 1st and Dec 31st. The dependent variable is an indicator for purchase within a category. Obese is a dummy variable if an individual is in the obese or extremely obese BMI bracket. Price is measured in dollars per ounce, and inventory in ounces. All regressions include individual fixed effects, and standard errors are clustered at the individual level. *, **, and *** indicate at the 10%, 5%, and 1% levels, respectively.

Table 31: Regression of Quantity Purchased (Given Purchase) on Price and BMI, Tempting Categories

	Ice Cream		Desserts		Chocolate		Snacks	
Regressor	(1)	(2)	(1)	(2)	(1)	(2)	(1)	(2)
BMI	-0.3804	-0.0754	-0.1902	0.0728	0.0865	0.2195	0.0263	0.0715
	(0.8588)	(0.2939)	(0.1321)	(0.0699)	(0.0968)	(0.1369)	(0.0925)	(0.0873)
Inventory	8.4075	8.7288	-2.9473	-3.0286	-14.1037*	-14.3272*	-4.4414	-4.3633
	(8.8119)	(8.8415)	(4.5661)	(4.6216)	(7.7025)	(7.7108)	(4.3948)	(4.3622)
BMI × Inventory	-0.1348	-0.1448	0.0531	0.0556	0.1714	0.1773	0.0596	0.0573
	(0.2279)	(0.2284)	(0.1524)	(0.1544)	(0.2162)	(0.2160)	(0.1399)	(0.1388)
log (Price)	-13.4491	-	2.2888	-	-11.5058***	-	-3.7069	-
	(11.6182)		(2.2062)		(3.2351)		(2.3023)	
log (Price) × BMI	-0.1078	-	-0.0886	-	-0.0142	-	0.0175	-
	(0.3449)		(0.0697)		(0.1033)		(0.0756)	
Price	-	-86.6237	-	15.4374*	-	-21.2966**	-	-5.7251
		(87.3962)		(9.0394)		(8.3792)		(7.4056)
Deal	-	5.3231	-	1.7400	-	4.6761*	-	2.0617
		(8.6061)		(2.0428)		(2.7522)		(1.5639)
Price × BMI	-	-0.8324	-	-0.5657*	-	-0.1736	-	-0.1387
		(2.7090)		(0.2930)		(0.2718)		(0.2416)
Deal × BMI	-	0.0718	-	-0.0553	-	-0.1343	-	-0.0652
		(0.2650)		(0.0647)		(0.0893)		(0.0511)
Constant	32.2403	70.1191***	23.6773***	16.7018***	5.7479*	23.1658***	11.0590***	16.4929***
	(28.6915)	(9.8610)	(4.1861)	(2.1454)	(3.0453)	(4.1520)	(2.8063)	(2.6968)
N	13019	13019	22307	22307	31500	31500	33615	33615

Notes: An observation in this regression an individual shopping trip occurring between Oct 1st and Dec 31st where a purchase occurs in the given category. The dependent variable is total quantity purchased within the category, measured in ounces. Price is measured in dollars per ounce, and inventory in ounces. All regressions include individual fixed effects, and standard errors are clustered at the individual level. *, **, and *** indicate at the 10%, 5%, and 1% levels, respectively.

Table 32: Regression of Quantity Purchased (Given Purchase) on Price and BMI, Non-Tempting Categories

	Fr. Vegetables		Pasta		Cereal		Salad	
Regressor	(1)	(2)	(1)	(2)	(1)	(2)	(1)	(2)
BMI	-0.4121	0.7913**	2.5165*	-1.0694**	-0.1948	-0.0786	0.0051	-0.1482
	(0.5092)	(0.3380)	(1.3135)	(0.5416)	(0.5016)	(0.3216)	(0.0969)	(0.0983)
Inventory	-3.1386	-3.4939	-5.9924	-5.9593	64.3630*	64.5767*	2.3146	2.3944
	(6.8336)	(6.9288)	(9.9552)	(9.9771)	(35.2490)	(35.3238)	(4.5800)	(4.5965)
BMI × Inventory	-0.1003	-0.0910	0.0561	0.0481	-2.1629*	-2.1715*	-0.0687	-0.0722
	(0.2651)	(0.2678)	(0.4243)	(0.4255)	(1.2979)	(1.3002)	(0.1743)	(0.1751)
log (Price)	1.3606	-	-44.7609**	-	-3.6998	-	-4.6694**	-
	(8.1013)		(17.7573)		(10.7068)		(2.3444)	
log (Price) × BMI	-0.3468	-	1.0622**	-	-0.0938	-	0.0421	-
	(0.2569)		(0.5313)		(0.3255)		(0.0763)	
Price	-	53.3552	-	-3.9e+02**	-	-12.4790	-	-16.9071**
		(62.9907)		(177.8305)		(39.7805)		(8.4027)
Deal	-	10.1204*	-	4.7427	-	-0.0136	-	-1.9843
		(5.6783)		(6.0956)		(6.5965)		(1.9513)
Price × BMI	-	-3.2163	-	11.0840*	-	-0.1454	-	0.2262
		(1.9982)		(5.6720)		(1.2750)		(0.2869)
Deal × BMI	-	-0.1904	-	0.0307	-	0.1369	-	0.0891
		(0.1808)		(0.1977)		(0.2097)		(0.0631)
Constant	28.5410*	15.0759	-78.7386*	63.0805***	23.2656	31.7762***	10.3835***	21.9482***
	(16.0607)	(10.4470)	(43.7524)	(16.8359)	(16.4763)	(9.5901)	(2.9118)	(2.8825)
N	12924	12924	6767	6767	18935	18935	13396	13396

Notes: An observation in this regression an individual shopping trip occurring between Oct 1st and Dec 31st where a purchase occurs in the given category. The dependent variable is total quantity purchased within the category, measured in ounces. Price is measured in dollars per ounce, and inventory in ounces. All regressions include individual fixed effects, and standard errors are clustered at the individual level. *, **, and *** indicate at the 10%, 5%, and 1% levels, respectively.

Table 33: Regression of Purchase Indicator on Price, BMI, and Obesity-Related Disease, Tempting Categories

	Ice Cream		Desserts		Chocolate		Snacks	
Regressor	(1)	(2)	(1)	(2)	(1)	(2)	(1)	(2)
BMI	-0.0012*	0.0007*	-0.0020**	0.0012**	0.0003	-0.0022**	-0.0019**	0.0022**
	(0.0007)	(0.0004)	(0.0010)	(0.0005)	(0.0006)	(0.0009)	(0.0010)	(0.0010)
Inventory	-0.0747***	-0.0745***	-0.0679	-0.0693	-0.1772***	-0.1790***	-0.1887***	-0.1878***
	(0.0196)	(0.0196)	(0.0463)	(0.0464)	(0.0435)	(0.0427)	(0.0480)	(0.0480)
BMI × Inventory	0.0014**	0.0014**	-0.0007	-0.0006	0.0025*	0.0025*	0.0018	0.0018
	(0.0006)	(0.0006)	(0.0014)	(0.0014)	(0.0015)	(0.0014)	(0.0015)	(0.0015)
log (Price)	-0.0305***	-	0.0295*	-	-0.0683***	-	-0.0958***	-
	(0.0095)		(0.0161)		(0.0193)		(0.0247)	
log (Price) × BMI	-0.0008**	-	-0.0013**	-	0.0001	-	-0.0016*	-
	(0.0003)		(0.0006)		(0.0007)		(0.0008)	
Price	-	-0.2325***	-	0.0453	-	-0.1738***	-	-0.2664***
		(0.0796)		(0.0653)		(0.0511)		(0.0772)
Deal	-	0.0152	-	0.0382**	-	0.0442*	-	0.0120
		(0.0143)		(0.0171)		(0.0226)		(0.0208)
Price × BMI	-	-0.0046*	-	-0.0022	-	0.0042**	-	-0.0058**
		(0.0026)		(0.0024)		(0.0018)		(0.0025)
Deal × BMI	-	0.0006	-	-0.0009	-	0.0016**	-	-0.0012*
		(0.0005)		(0.0006)		(0.0008)		(0.0007)
Disease Condition	-0.0131	-	-0.0019	-	0.0011	-	-0.0291**	-
	(0.0133)		(0.0160)		(0.0101)		(0.0146)	
Disease Condition × log (Price)	-0.0057	-	0.0007	-	-0.0012	-	-0.0207	-
	(0.0067)		(0.0115)		(0.0152)		(0.0173)	
Disease Condition × log (Price) × BMI	0.0000	-	-0.0001	-	0.0002	-	-0.0001	-
	(0.0001)		(0.0003)		(0.0004)		(0.0004)	
Disease Condition × Price	-	0.0063	-	0.0050	-	-0.0116	-	0.0132
		(0.0072)		(0.0082)		(0.0155)		(0.0156)
Disease Condition × Price × BMI	-	-0.0764	-	0.1155	-	0.0807**	-	-0.0305
		(0.0977)		(0.0887)		(0.0409)		(0.0611)
Disease Condition × Deal	-	0.0008	-	-0.0046*	-	-0.0021**	-	-0.0010
		(0.0027)		(0.0027)		(0.0010)		(0.0016)
Disease Condition × Deal × BMI	-	-0.0060	-	-0.0353	-	-0.0502*	-	-0.0178
		(0.0203)		(0.0283)		(0.0296)		(0.0294)
Constant	-0.0232	0.0000	0.1539***	0.0013	0.0639***	0.0018*	0.0364	0.0009
	(0.0216)	(0.0007)	(0.0296)	(0.0009)	(0.0179)	(0.0009)	(0.0291)	(0.0010)
N	225890	225890	200854	200854	252583	252583	246532	246532

Notes: An observation in this regression an individual shopping trip occurring between Oct 1st and Dec 31st. The dependent variable is an indicator for purchase within a category. Price is measured in dollars per ounce, and inventory in ounces. The dummy variable Disease is 1 if an individual answers that she is a sufferer or treats any of the four diseases in Table 22. All regressions include individual fixed effects, and standard errors are clustered at the individual level. *, **, and *** indicate at the 10%, 5%, and 1% levels, respectively.

Table 34: Regression of Purchase Indicator on Price, BMI, and Disease, Non-Tempting Categories

	Fr. Vegetables		Pasta		Cereal		Salad	
Regressor	(1)	(2)	(1)	(2)	(1)	(2)	(1)	(2)
BMI	0.0028*	-0.0006	0.0007	0.0006	0.0014*	0.0003	0.0004	0.0003
	(0.0015)	(0.0009)	(0.0009)	(0.0004)	(0.0008)	(0.0006)	(0.0007)	(0.0007)
Inventory	-0.0200	-0.0227	0.0376	0.0379	0.0785*	0.0782*	-0.0122	-0.0134
	(0.0411)	(0.0411)	(0.0616)	(0.0619)	(0.0463)	(0.0464)	(0.0483)	(0.0482)
BMI × Inventory	-0.0026*	-0.0025*	-0.0053**	-0.0053**	-0.0050***	-0.0049***	-0.0022	-0.0021
	(0.0014)	(0.0014)	(0.0021)	(0.0021)	(0.0014)	(0.0014)	(0.0021)	(0.0021)
log (Price)	-0.0478**	-	-0.0390***	-	-0.1151***	-	-0.0508***	-
	(0.0236)		(0.0114)		(0.0163)		(0.0176)	
log (Price) × BMI	0.0011	-	0.0001	-	0.0008	-	0.0003	-
	(0.0008)		(0.0004)		(0.0005)		(0.0006)	
Price	-	-0.2218	-	-0.2244*	-	-0.3493***	-	-0.1300**
		(0.1899)		(0.1284)		(0.0617)		(0.0576)
Deal	-	0.0521***	-	0.0257***	-	0.0289	-	0.0164
		(0.0187)		(0.0082)		(0.0190)		(0.0167)
Price × BMI	-	0.0095	-	-0.0004	-	0.0015	-	-0.0007
		(0.0061)		(0.0042)		(0.0019)		(0.0020)
Deal × BMI	-	0.0001	-	-0.0003	-	-0.0009	-	0.0001
		(0.0007)		(0.0003)		(0.0006)		(0.0006)
Disease Condition	-0.0009	-	0.0112	-	0.0118	-	0.0081	-
	(0.0248)		(0.0139)		(0.0119)		(0.0138)	
Disease Condition × log (Price)	-0.0053	-	0.0045	-	0.0203*	-	0.0016	-
	(0.0135)		(0.0063)		(0.0108)		(0.0126)	
Disease Condition × log (Price) × BMI	0.0002	-	0.0000	-	-0.0006***	-	-0.0001	-
	(0.0002)		(0.0001)		(0.0002)		(0.0003)	
Disease Condition × Price	-	-0.0150	-	0.0009	-	0.0095	-	0.0118
		(0.0142)		(0.0064)		(0.0090)		(0.0132)
Disease Condition × Price × BMI	-	0.1316	-	0.0683	-	-0.0554	-	-0.0607
		(0.1340)		(0.1013)		(0.0575)		(0.0576)
Disease Condition × Deal	-	-0.0021	-	-0.0021	-	0.0018	-	0.0016
		(0.0030)		(0.0027)		(0.0017)		(0.0014)
Disease Condition × Deal × BMI	-	0.0232	-	-0.0078	-	-0.0261	-	0.0255
		(0.0277)		(0.0124)		(0.0268)		(0.0258)
Constant	-0.0385	-0.0006	-0.0702**	0.0001	-0.0981***	0.0006	0.0122	-0.0007
	(0.0471)	(0.0009)	(0.0273)	(0.0004)	(0.0242)	(0.0008)	(0.0217)	(0.0008)
N	177699	177699	204477	204477	238619	238619	169700	169700

Notes: An observation in this regression an individual shopping trip occurring between Oct 1st and Dec 31st. The dependent variable is an indicator for purchase within a category. Price is measured in dollars per ounce, and inventory in ounces. The dummy variable Disease is 1 if an individual answers that she is a sufferer or treats any of the four diseases in Table 22. All regressions include individual fixed effects, and standard errors are clustered at the individual level. *, **, and *** indicate at the 10%, 5%, and 1% levels, respectively.

Table 35: Regression of Purchase Indicator on Price, BMI, and Weight Concern, Tempting Categories

	Ice Cream		Desserts		Chocolate		Snacks	
Regressor	(1)	(2)	(1)	(2)	(1)	(2)	(1)	(2)
BMI	-0.0017**	-0.0017**	-0.0020*	-0.0021*	0.0003	0.0004	-0.0028***	-0.0031***
	(0.0008)	(0.0008)	(0.0011)	(0.0011)	(0.0007)	(0.0007)	(0.0010)	(0.0010)
Inventory	-0.0682***	-0.0677***	-0.0619	-0.0614	-0.1590***	-0.1640***	-0.1839***	-0.1821***
	(0.0214)	(0.0212)	(0.0475)	(0.0475)	(0.0441)	(0.0437)	(0.0541)	(0.0537)
BMI × Inventory	0.0014**	0.0014**	-0.0007	-0.0007	0.0016	0.0018	0.0019	0.0018
	(0.0006)	(0.0006)	(0.0015)	(0.0015)	(0.0015)	(0.0015)	(0.0017)	(0.0017)
log (Price)	-0.0268***	-	0.0328**	-	-0.0650***	-	-0.0917***	-
	(0.0103)		(0.0162)		(0.0202)		(0.0253)	
log (Price) × BMI	-0.0011***	-	-0.0015***	-	0.0000	-	-0.0022**	-
	(0.0004)		(0.0006)		(0.0007)		(0.0009)	
Price	-	-0.0209*	-	0.0364**	-	-0.0599***	-	-0.0913***
		(0.0116)		(0.0163)		(0.0227)		(0.0297)
Deal	-	0.0271	-	0.0229	-	0.0175	-	0.0044
		(0.0195)		(0.0177)		(0.0251)		(0.0259)
Price × BMI	-	-0.0011***	-	-0.0016***	-	0.0014*	-	-0.0027***
		(0.0004)		(0.0006)		(0.0008)		(0.0010)
Deal × BMI	-	0.0002	-	-0.0003	-	0.0026***	-	-0.0010
		(0.0007)		(0.0006)		(0.0009)		(0.0009)
Concern	0.0083	-	-0.0018	-	0.0022	-	0.0257*	-
	(0.0122)		(0.0170)		(0.0107)		(0.0155)	
Concern × log (Price)	-0.0002	-	-0.0076	-	-0.0040	-	0.0300	-
	(0.0065)		(0.0111)		(0.0162)		(0.0197)	
Concern × log (Price) × BMI	0.0002	-	0.0002	-	0.0001	-	-0.0003	-
	(0.0001)		(0.0002)		(0.0004)		(0.0005)	
Concern × Price	-	0.0076	-	-0.0018	-	0.0001	-	0.0278*
		(0.0121)		(0.0170)		(0.0106)		(0.0160)
Concern × Price × BMI	-	-0.0062	-	-0.0078	-	-0.0002	-	0.0310
		(0.0095)		(0.0115)		(0.0248)		(0.0266)
Concern × Deal	-	0.0003	-	0.0002	-	-0.0001	-	-0.0002
		(0.0003)		(0.0002)		(0.0007)		(0.0008)
Concern × Deal × BMI	-	-0.0319	-	-0.0010	-	0.0150	-	-0.0031
		(0.0323)		(0.0311)		(0.0452)		(0.0419)
Constant	-0.0209	0.0009	0.1531***	-0.0000	0.0631***	-0.0004	0.0426	0.0003
	(0.0224)	(0.0011)	(0.0305)	(0.0010)	(0.0185)	(0.0014)	(0.0292)	(0.0014)
N	219384	219384	200852	200852	249506	249506	246548	246548

Notes: An observation in this regression an individual shopping trip occurring between Oct 1st and Dec 31st. The dependent variable is an indicator for purchase within a category. Price is measured in dollars per ounce, and inventory in ounces. The dummy variable Concern is 1 if an individual answers that he/she is very concerned about his/her weight on the Medprofiler survey. All regressions include individual fixed effects, and standard errors are clustered at the individual level. *, **, and *** indicate at the 10%, 5%, and 1% levels, respectively.

Table 36: Regression of Purchase Indicator on Price, BMI, and Weight Concern, Non-Tempting Categories

	Fr. Vegetables		Pasta		Cereal		Salad	
Regressor	(1)	(2)	(1)	(2)	(1)	(2)	(1)	(2)
BMI	0.0021	0.0028*	0.0006	0.0004	0.0013	0.0014*	0.0004	0.0004
	(0.0016)	(0.0017)	(0.0010)	(0.0010)	(0.0008)	(0.0008)	(0.0008)	(0.0007)
Inventory	-0.0104	-0.0128	0.0451	0.0446	0.0089	0.0085	0.0264	0.0259
	(0.0430)	(0.0431)	(0.0828)	(0.0830)	(0.0453)	(0.0453)	(0.0500)	(0.0502)
BMI × Inventory	-0.0029**	-0.0029**	-0.0059**	-0.0059**	-0.0030**	-0.0030**	-0.0027	-0.0027
	(0.0014)	(0.0014)	(0.0026)	(0.0027)	(0.0015)	(0.0015)	(0.0022)	(0.0022)
log (Price)	-0.0452*	-	-0.0384***	-	-0.1071***	-	-0.0468***	-
	(0.0240)		(0.0120)		(0.0164)		(0.0179)	
log (Price) × BMI	0.0008	-	0.0001	-	0.0005	-	0.0001	-
	(0.0008)		(0.0004)		(0.0005)		(0.0006)	
Price	-	-0.0245	-	-0.0241**	-	-0.1037***	-	-0.0365**
		(0.0258)		(0.0122)		(0.0177)		(0.0186)
Deal	-	0.0546**	-	0.0147	-	0.0157	-	0.0273
		(0.0212)		(0.0090)		(0.0227)		(0.0179)
Price × BMI	-	0.0011	-	0.0001	-	0.0004	-	0.0001
		(0.0009)		(0.0004)		(0.0006)		(0.0006)
Deal × BMI	-	0.0001	-	0.0001	-	-0.0006	-	-0.0001
		(0.0008)		(0.0003)		(0.0008)		(0.0006)
Concern	0.0342	-	0.0062	-	0.0029	-	0.0080	-
	(0.0229)		(0.0156)		(0.0122)		(0.0133)	
Concern × log (Price)	0.0161	-	0.0060	-	0.0004	-	-0.0093	-
	(0.0122)		(0.0070)		(0.0109)		(0.0135)	
Concern × log (Price) × BMI	-0.0000	-	-0.0001	-	0.0001	-	0.0003	-
	(0.0002)		(0.0001)		(0.0002)		(0.0003)	
Concern × Price	-	0.0338	-	0.0022	-	0.0026	-	0.0079
		(0.0235)		(0.0160)		(0.0122)		(0.0132)
Concern × Price × BMI	-	0.0196	-	0.0061	-	0.0039	-	-0.0091
		(0.0136)		(0.0074)		(0.0139)		(0.0163)
Concern × Deal	-	-0.0001	-	-0.0002*	-	-0.0000	-	0.0002
		(0.0002)		(0.0001)		(0.0003)		(0.0004)
Concern × Deal × BMI	-	0.0285	-	0.0117	-	0.0138	-	0.0012
		(0.0339)		(0.0138)		(0.0321)		(0.0295)
Constant	-0.0294	-0.0006	-0.0648**	-0.0005	-0.0925***	-0.0004	0.0140	-0.0000
	(0.0475)	(0.0011)	(0.0287)	(0.0004)	(0.0242)	(0.0010)	(0.0226)	(0.0009)
N	177696	177696	204487	204487	238622	238622	165163	165163

Notes: An observation in this regression an individual shopping trip occurring between Oct 1st and Dec 31st. The dependent variable is an indicator for purchase within a category. Price is measured in dollars per ounce, and inventory in ounces. The dummy variable Concern is 1 if an individual answers that he/she is very concerned about his/her weight on the Medprofiler survey. All regressions include individual fixed effects, and standard errors are clustered at the individual level. *, **, and *** indicate at the 10%, 5%, and 1% levels, respectively.

Table 37: Regression of Purchase Indicator on Price, BMI, and Recognition of Obesity as a Disease, Tempting Categories

	Ice Cream		Desserts		Chocolate		Snacks	
Regressor	(1)	(2)	(1)	(2)	(1)	(2)	(1)	(2)
BMI	-0.0013*	0.0008**	-0.0018	0.0012**	0.0006	-0.0025***	-0.0024**	0.0023**
	(0.0008)	(0.0004)	(0.0011)	(0.0005)	(0.0007)	(0.0009)	(0.0011)	(0.0011)
Inventory	-0.0746***	-0.0740***	-0.0669	-0.0658	-0.1770***	-0.1794***	-0.1878***	-0.1872***
	(0.0197)	(0.0196)	(0.0465)	(0.0465)	(0.0436)	(0.0427)	(0.0475)	(0.0475)
BMI × Inventory	0.0014**	0.0013**	-0.0007	-0.0008	0.0024*	0.0025*	0.0018	0.0018
	(0.0006)	(0.0006)	(0.0014)	(0.0014)	(0.0015)	(0.0014)	(0.0015)	(0.0015)
log (Price)	-0.0318***	-	0.0262	-	-0.0742***	-	-0.0914***	-
	(0.0100)		(0.0169)		(0.0202)		(0.0271)	
log (Price) × BMI	-0.0008**	-	-0.0012**	-	0.0005	-	-0.0021**	-
	(0.0004)		(0.0006)		(0.0007)		(0.0010)	
Price	-	-0.2832***	-	0.0958	-	-0.1581***	-	-0.2609***
		(0.0772)		(0.0688)		(0.0506)		(0.0818)
Deal	-	0.0328**	-	0.0393**	-	0.0153	-	-0.0068
		(0.0130)		(0.0159)		(0.0214)		(0.0209)
Price × BMI	-	-0.0034	-	-0.0042	-	0.0041**	-	-0.0067**
		(0.0027)		(0.0026)		(0.0018)		(0.0029)
Deal × BMI	-	-0.0002	-	-0.0010*	-	0.0027***	-	-0.0003
		(0.0005)		(0.0006)		(0.0007)		(0.0007)
Obese Disease	-0.0027	-	-0.0054	-	-0.0157	-	0.0064	-
	(0.0151)		(0.0213)		(0.0138)		(0.0206)	
Obese Disease × log (Price)	-0.0001	-	-0.0009	-	-0.0257	-	-0.0022	-
	(0.0079)		(0.0145)		(0.0204)		(0.0258)	
Obese Disease × log (Price) × BMI	-0.0000	-	-0.0001	-	0.0003	-	0.0002	-
	(0.0002)		(0.0003)		(0.0004)		(0.0006)	
Obese Disease × Price	-	-0.0043	-	0.0076	-	0.0108	-	0.0044
		(0.0087)		(0.0093)		(0.0204)		(0.0219)
Obese Disease × Price × BMI	-	0.1345	-	-0.0538	-	-0.0292	-	0.0361
		(0.1378)		(0.1001)		(0.0580)		(0.1037)
Obese Disease × Deal	-	-0.0041	-	0.0009	-	-0.0000	-	-0.0010
		(0.0035)		(0.0026)		(0.0012)		(0.0022)
Obese Disease × Deal × BMI	-	-0.0437	-	-0.0459	-	0.0279	-	-0.0016
		(0.0281)		(0.0422)		(0.0411)		(0.0423)
Constant	-0.0257	0.0016**	0.1486***	0.0016	0.0573***	-0.0008	0.0377	-0.0002
	(0.0220)	(0.0008)	(0.0322)	(0.0012)	(0.0184)	(0.0011)	(0.0311)	(0.0012)
N	225890	225890	200854	200854	252583	252583	246532	246532

Notes: An observation in this regression an individual shopping trip occurring between Oct 1st and Dec 31st. The dependent variable is an indicator for purchase within a category. Price is measured in dollars per ounce, and inventory in ounces. The dummy variable Obese Disease is 1 if an individual answers she is a sufferer or is treating obesity on the Medprofiler question tabulated in the third panel of Table 3. All regressions include individual fixed effects, and standard errors are clustered at the individual level. *, **, and *** indicate at the 10%, 5%, and 1% levels, respectively.

Table 38: Regression of Purchase Indicator on Price, BMI, and Recognition of Obesity as a Disease, Non-Tempting Categories

	Fr. Vegetables		Pasta		Cereal		Salad	
Regressor	(1)	(2)	(1)	(2)	(1)	(2)	(1)	(2)
BMI	0.0021	-0.0005	0.0013	0.0002	0.0017**	0.0003	0.0002	0.0004
	(0.0017)	(0.0010)	(0.0010)	(0.0005)	(0.0009)	(0.0007)	(0.0008)	(0.0007)
Inventory	-0.0217	-0.0246	0.0377	0.0380	0.0773*	0.0772*	-0.0121	-0.0132
	(0.0411)	(0.0411)	(0.0616)	(0.0619)	(0.0466)	(0.0467)	(0.0481)	(0.0480)
BMI × Inventory	-0.0025*	-0.0024*	-0.0053**	-0.0053**	-0.0049***	-0.0049***	-0.0022	-0.0021
	(0.0014)	(0.0014)	(0.0021)	(0.0021)	(0.0014)	(0.0014)	(0.0021)	(0.0021)
log (Price)	-0.0447*	-	-0.0428***	-	-0.1077***	-	-0.0430**	-
	(0.0254)		(0.0122)		(0.0174)		(0.0180)	
log (Price) × BMI	0.0009	-	0.0004	-	0.0006	-	-0.0001	-
	(0.0009)		(0.0004)		(0.0006)		(0.0006)	
Price	-	-0.1308	-	-0.2809**	-	-0.4112***	-	-0.1459**
		(0.2009)		(0.1362)		(0.0661)		(0.0610)
Deal	-	0.0590***	-	0.0209***	-	0.0221	-	0.0167
		(0.0189)		(0.0079)		(0.0192)		(0.0157)
Price × BMI	-	0.0066	-	0.0024	-	0.0037*	-	-0.0003
		(0.0068)		(0.0047)		(0.0022)		(0.0021)
Deal × BMI	-	-0.0000	-	-0.0001	-	-0.0007	-	0.0002
		(0.0007)		(0.0003)		(0.0007)		(0.0006)
Obese Disease	0.0255	-	-0.0123	-	-0.0086	-	0.0074	-
	(0.0282)		(0.0175)		(0.0152)		(0.0149)	
Obese Disease × log (Price)	0.0257*	-	-0.0035	-	-0.0171	-	-0.0028	-
	(0.0151)		(0.0083)		(0.0128)		(0.0150)	
Obese Disease × log (Price) × BMI	-0.0003*	-	-0.0000	-	0.0004*	-	0.0003	-
	(0.0002)		(0.0001)		(0.0002)		(0.0003)	
Obese Disease × Price	-	-0.0151	-	0.0128	-	0.0009	-	-0.0052
		(0.0164)		(0.0079)		(0.0107)		(0.0150)
Obese Disease × Price × BMI	-	-0.0278	-	-0.1575	-	0.1328*	-	0.0220
		(0.1573)		(0.1130)		(0.0779)		(0.0712)
Obese Disease × Deal	-	0.0032	-	0.0008	-	-0.0040*	-	-0.0004
		(0.0032)		(0.0028)		(0.0020)		(0.0016)
Obese Disease × Deal × BMI	-	-0.0122	-	0.0020	-	-0.0282	-	0.0289
		(0.0395)		(0.0193)		(0.0366)		(0.0350)
Constant	-0.0228	0.0003	-0.0784***	-0.0001	-0.1004***	0.0006	0.0201	-0.0010
	(0.0508)	(0.0011)	(0.0295)	(0.0005)	(0.0256)	(0.0010)	(0.0225)	(0.0009)
N	177699	177699	204477	204477	238619	238619	169700	169700

Notes: An observation in this regression an individual shopping trip occurring between Oct 1st and Dec 31st. The dependent variable is an indicator for purchase within a category. Price is measured in dollars per ounce, and inventory in ounces. The dummy variable Obese Disease is 1 if an individual answers she is a sufferer or is treating obesity on the Medprofiler question tabulated in the third panel of Table 3. All regressions include individual fixed effects, and standard errors are clustered at the individual level. *, **, and *** indicate at the 10%, 5%, and 1% levels, respectively.

Table 39: Regression of Purchase Indicator on Price, BMI, and Weight Perception, Tempting Categories

	Ice Cream		Desserts		Chocolate		Snacks	
Regressor	(1)	(2)	(1)	(2)	(1)	(2)	(1)	(2)
BMI	-0.0013*	0.0007**	-0.0020*	0.0013**	0.0003	-0.0023***	-0.0020**	0.0026***
	(0.0007)	(0.0004)	(0.0010)	(0.0005)	(0.0006)	(0.0009)	(0.0010)	(0.0010)
Inventory	-0.0746***	-0.0742***	-0.0683	-0.0685	-0.1784***	-0.1801***	-0.1870***	-0.1861***
	(0.0197)	(0.0196)	(0.0464)	(0.0464)	(0.0434)	(0.0424)	(0.0482)	(0.0481)
BMI × Inventory	0.0013**	0.0013**	-0.0007	-0.0007	0.0025*	0.0025*	0.0018	0.0018
	(0.0006)	(0.0006)	(0.0014)	(0.0014)	(0.0015)	(0.0014)	(0.0015)	(0.0015)
log (Price)	-0.0307***	-	0.0302*	-	-0.0689***	-	-0.0935***	-
	(0.0094)		(0.0157)		(0.0192)		(0.0240)	
log (Price) × BMI	-0.0008***	-	-0.0014**	-	0.0002	-	-0.0019**	-
	(0.0003)		(0.0005)		(0.0007)		(0.0008)	
Price	-	-0.2469***	-	0.1090*	-	-0.1427***	-	-0.2554***
		(0.0740)		(0.0630)		(0.0491)		(0.0768)
Deal	-	0.0134	-	0.0173	-	0.0163	-	0.0014
		(0.0121)		(0.0141)		(0.0195)		(0.0174)
Price × BMI	-	-0.0048*	-	-0.0048**	-	0.0033*	-	-0.0070***
		(0.0025)		(0.0023)		(0.0017)		(0.0026)
Deal × BMI	-	0.0007*	-	-0.0001	-	0.0026***	-	-0.0008
		(0.0004)		(0.0005)		(0.0007)		(0.0006)
Weight Perception	0.0056	-	-0.0064	-	-0.0056	-	-0.0068	-
	(0.0135)		(0.0190)		(0.0123)		(0.0180)	
Weight Perception × log (Price)	-0.0041	-	-0.0002	-	-0.0082	-	-0.0385	-
	(0.0075)		(0.0156)		(0.0228)		(0.0259)	
Weight Perception × log (Price) × BMI	0.0002	-	-0.0000	-	0.0004	-	0.0012*	-
	(0.0001)		(0.0004)		(0.0006)		(0.0006)	
Weight Perception × Price	-	0.0079	-	-0.0048	-	-0.0135	-	-0.0190
		(0.0078)		(0.0092)		(0.0185)		(0.0198)
Weight Perception × Price × BMI	-	0.0135	-	-0.1072	-	-0.0666	-	0.0837
		(0.1250)		(0.1370)		(0.0573)		(0.1094)
Weight Perception × Deal	-	-0.0004	-	0.0033	-	0.0023	-	-0.0018
		(0.0037)		(0.0039)		(0.0014)		(0.0029)
Weight Perception × Deal × BMI	-	-0.0102	-	0.0734	-	0.0879	-	0.0342
		(0.0338)		(0.0716)		(0.0547)		(0.0684)
Constant	-0.0261	-0.0001	0.1539***	-0.0025	0.0634***	-0.0027	0.0298	-0.0006
	(0.0214)	(0.0010)	(0.0302)	(0.0021)	(0.0182)	(0.0016)	(0.0292)	(0.0020)
N	225890	225890	200854	200854	252583	252583	246532	246532

Notes:An observation in this regression an individual shopping trip occurring between Oct 1st and Dec 31st. The dependent variable is an indicator for purchase within a category. Price is measured in dollars per ounce, and inventory in ounces. The dummy variable Weight Perception is 1 if an individual is obese and answers he/she is slightly overweight or less on Table 3. All regressions include individual fixed effects, and standard errors are clustered at the individual level. *, **, and *** indicate at the 10%, 5%, and 1% levels, respectively.

Table 40: Regression of Purchase Indicator on Price, BMI, and Weight Perception, Non-Tempting Categories

	Fr. Vegetables		Pasta		Cereal		Salad	
Regressor	(1)	(2)	(1)	(2)	(1)	(2)	(1)	(2)
BMI	0.0032**	-0.0007	0.0007	0.0006	0.0013*	0.0004	0.0005	0.0002
	(0.0016)	(0.0009)	(0.0009)	(0.0004)	(0.0008)	(0.0006)	(0.0007)	(0.0006)
Inventory	-0.0197	-0.0224	0.0375	0.0378	0.0772*	0.0769	-0.0126	-0.0138
	(0.0411)	(0.0411)	(0.0616)	(0.0619)	(0.0465)	(0.0466)	(0.0482)	(0.0483)
BMI × Inventory	-0.0026*	-0.0025*	-0.0053**	-0.0053**	-0.0049***	-0.0049***	-0.0021	-0.0021
	(0.0014)	(0.0014)	(0.0021)	(0.0021)	(0.0014)	(0.0014)	(0.0021)	(0.0021)
log (Price)	-0.0527**	-	-0.0387***	-	-0.1065***	-	-0.0506***	-
	(0.0236)		(0.0114)		(0.0161)		(0.0169)	
log (Price) × BMI	0.0013*	-	0.0002	-	0.0005	-	0.0003	-
	(0.0008)		(0.0004)		(0.0005)		(0.0005)	
Price	-	-0.2240	-	-0.1841	-	-0.3684***	-	-0.1518***
		(0.1872)		(0.1224)		(0.0589)		(0.0581)
Deal	-	0.0619***	-	0.0242***	-	0.0210	-	0.0265**
		(0.0155)		(0.0065)		(0.0159)		(0.0134)
Price × BMI	-	0.0105*	-	-0.0021	-	0.0019	-	0.0001
		(0.0061)		(0.0040)		(0.0018)		(0.0019)
Deal × BMI	-	-0.0002	-	-0.0003	-	-0.0007	-	-0.0001
		(0.0005)		(0.0002)		(0.0005)		(0.0005)
Weight Perception	-0.0226	-	0.0125	-	0.0232	-	-0.0058	-
	(0.0288)		(0.0161)		(0.0142)		(0.0153)	
Weight Perception × log (Price)	-0.0233	-	0.0123	-	0.0191	-	0.0011	-
	(0.0171)		(0.0082)		(0.0144)		(0.0172)	
Weight Perception × log (Price) × BMI	0.0004	-	-0.0002	-	-0.0001	-	-0.0002	-
	(0.0003)		(0.0001)		(0.0003)		(0.0004)	
Weight Perception × Price	-	-0.0003	-	-0.0055	-	-0.0063	-	0.0134
		(0.0174)		(0.0074)		(0.0104)		(0.0168)
Weight Perception × Price × BMI	-	0.3030	-	-0.1021	-	0.0831	-	-0.0091
		(0.2149)		(0.1497)		(0.1050)		(0.0940)
Weight Perception × Deal	-	-0.0099*	-	0.0049	-	-0.0012	-	-0.0008
		(0.0054)		(0.0040)		(0.0030)		(0.0024)
Weight Perception × Deal × BMI	-	-0.0343	-	0.0006	-	-0.0561	-	-0.0203
		(0.0706)		(0.0266)		(0.0538)		(0.0548)
Constant	-0.0477	0.0014	-0.0665**	0.0001	-0.0929***	0.0013	0.0158	0.0004
	(0.0474)	(0.0021)	(0.0275)	(0.0008)	(0.0242)	(0.0016)	(0.0219)	(0.0016)
N	177699	177699	204477	204477	238619	238619	169700	169700

Notes: An observation in this regression an individual shopping trip occurring between Oct 1st and Dec 31st. The dependent variable is an indicator for purchase within a category. Price is measured in dollars per ounce, and inventory in ounces. The dummy variable Weight Perception is 1 if an individual is obese and answers he/she is slightly overweight or less on Table 3. All regressions include individual fixed effects, and standard errors are clustered at the individual level. *, **, and *** indicate at the 10%, 5%, and 1% levels, respectively.

8 Appendix Figures

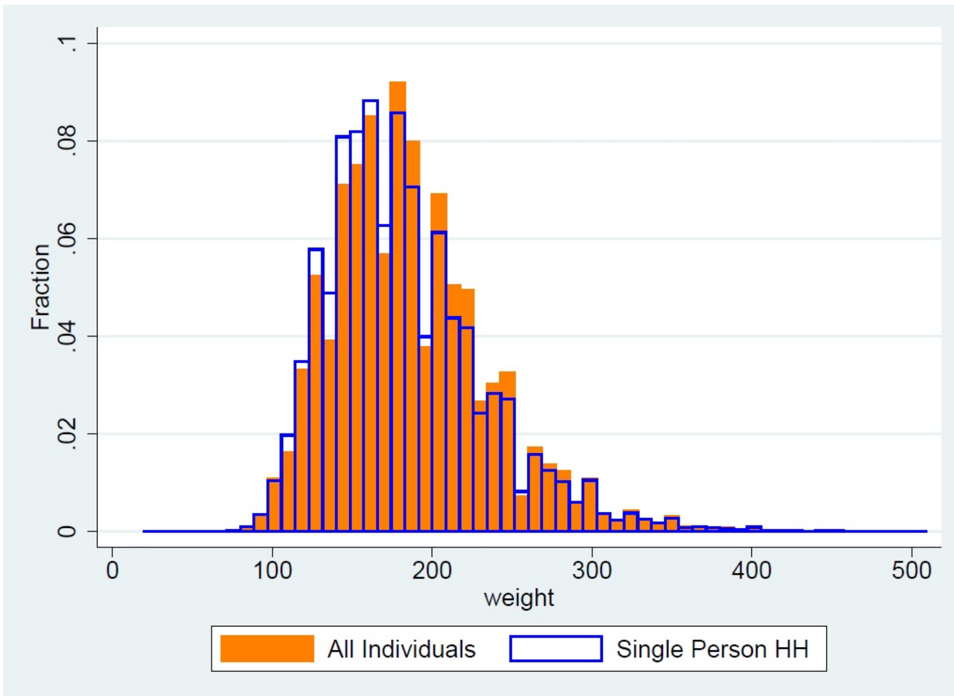

Figure 1: Weight distribution of individuals over 20 years old

Figure 2: BMI distribution of individuals over 20 years old. Dotted lines indicate BMI bracket cutoffs.