EFFECTS OF POSTING CALORIE INFORMATION ON QUICK SERVICE RESTAURANT MENUS*

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Paper to be presented at the
First Joint EAAE/AAEA Seminar "The Economics of Food, Food Choice and Health,"
Freising, Germany, September 15– 17, 2010.

*This paper builds on Joshua Nelson's senior project. Jill McCluskey supervised the project. The authors wish to thank Ron Mittelhammer and Phil Wandschneider for helpful comments and to Steve Nelson for providing the data.

Introduction

Obesity is one of the major health issues that we face today as a society with about one third of Americans who qualify as being obese (Flegal et al, 2010). In recent years, government policy makers have imposed new regulations that require food retailers to provide the nutritional facts for the food that they serve. In August 2009, King County (includes greater Seattle area) in the State of Washington passed a law requiring every quick service restaurant (QSR) to post the caloric content in each item on their menus. A similar law will be implemented on a National scale. President Barack Obama recently signed is due to come into effect in the coming year 20111. The new rule applies to restaurant chains with 20 or more locations. The focus of this study is to examine how the King County Washington calorie posting law has impacted the quick service restaurant (QSR) market in King County, Washington.

One would expect the provision of calorie information to affect consumer behavior. The posting of calorie information may increase awareness among some consumers and lead them to be influenced to a greater degree by calorie content. Consumers who are already aware of the calorie content will not be affected by the posting of calorie information. Overall, one would expect a decrease in the choice of higher calorie items. However, the provision of calorie information does not need to nudge consumers to make healthier choices in order for it to be beneficial. Convenient nutrition information can increase consumer welfare by helping shoppers to identify preferred products (Teisl et al, 2001). Consumers are better off if they can more easily

identify (at lower search costs) the products with the attributes that they want to consume.

Literature Review

There have been numerous studies on just how valuable nutritional labeling is and how much use it truly receives. Do people actually pay attention to the amount of calories they are ordering? Almost two third of the American population report noticing nutritional labeling and of those, approximately half of them use this information when deciding what to order (U.S. Food and Drug Administration, 2010). These numbers suggest that the impact of nutritional labeling can be significant and be a factor in the decision of consumers.

The evidence on how nutrition information affects consumer behavior is inconclusive. Using data from 2008 and 2009 from New York City after the implementation of a mandatory calorie posting law in 2008, Bolinger, Leslie, and Sorenson (2010) found that the average calories decreased by 6% per transaction, with most of the decrease coming from food rather than drink orders.

Teisl, Bockstael, and Levy (2001) found that providing nutrition information affected product categories differently. They argue that there are two effects for providing nutrition information: a health effect and a substitution effect. The health effect causes consumers to reduce consumption of unhealthy items and increase consumption of healthier products. The substitution effect allows consumers to

substitute across food categories to maintain the same level or better of health while increasing utility of other food attributes, such as flavor.

One also might expect calorie posting to pressure on restaurants to reformulate and make small changes in what they offer. Mathios (2000) used nutrition label information and supermarket scanner data pre- and post- Nutrition Labeling and Education Act (NLEA) to examine the impact of moving from a voluntary to a mandatory labeling regime on consumer product choice. He found that salad dressings with the highest fat levels experienced a significant decline in sales after they were required to disclose their nutrition information.

Theoretical Motivation

Calorie posting laws have been enacted to nudge Americans away from making unhealthy food choices. The goal of is to make consumers think about the food choices that they are making. It is incredibly easy to consume a meal when dining out that is high in calories. Calorie posting can benefit shoppers by effectively turning nutritional content into a search characteristic. As a result, economic efficiency is improved because consumers can buy the product with the characteristics that they want (Golan et al., 2001).

A natural assumption when analyzing the data for this would be to notice large increase in healthy products while experiencing a decrease in the unhealthy items offered. It is only logical to think that people would start changing their diets once they

realize actually how much they are consuming with one meal. The amount of calories that an adult man should ingest on a daily basis is approximately 2500. Any given meal can take up to half of this amount leaving the man with half the amount of calories and two more meals left to eat. By simply reducing the intake per meal, people would start to eat healthier. They could do this by substituting the items they usually order with healthier products.

Another theory is that this new law will not have a substantial effect on the trends of healthy and unhealthy product selection. This argument is based on the idea that people will simply shrug off this new information and continue to order the unhealthy products. For people to choose healthier options, they have to care about their fitness and health. Many Americans do not care enough about their health issues. Many health conscious people decide not to eat out at a fast food restaurant. There could be no real trend or noticeable difference with the monthly sales that would be caused by the newly established law.

In order to assess the effect of the calorie posting law on demand, we estimate demand regressions for specific menu items.

$$\log Q_{jkl} = \beta_0 + \beta_1 summer + \beta_2 Dec + \sum_{i=3}^{8} \beta_i x_i + \beta_9 CaloriePost + \varepsilon_{jkl} \quad (1)$$

where Q_{jkl} is the quantity sold of menu item *j* in restaurant *k* during the time period *l*, x_3 to x_8 are demographic variables that affect demand, *CaloriePost* is an indicator variable

that equals one during the time periods that the calorie posting law was in effect, 0 otherwise, β_0 is a constant term, β_1 to β_9 are coefficients to be estimated, and ε is an error term. The semi-log functional form was chosen over the linear form for all regressions because, for each one, it resulted in greater explanatory power as shown by R^2 statistics.

Data

Quantity of sales information for 14 King County, Washington Taco Time restaurants was obtained for the months August 2008 to February 2010. The data is proprietary firm data that was acquired directly from Taco Time Headquarters located in Renton, Washington. Demographic data was obtained from the U.S. Census for each restaurant based on the municipality in which it is located. The demographic variables include the monthly unemployment rate, the average salary, the average age, the population, the average household size, and the percentage of the adult population who are high school graduates. Summary statistics for all variables utilized in the analysis is presented in Table 1.

Discussion of Estimation Results

The demand regressions with quantities as the dependent variable were estimated with the statistical package STATA. The estimation results are presented in

Table 2. Demand equations were estimated for the following six menu items: beef soft tacos, chicken soft tacos, chicken lite tacos, Crustos (dessert menu item), Mexi Fries (potato side menu item), and chicken chili. The explanatory power ranged from an R^2 statistic of 0.25 for chicken chili to 0.33 for chicken soft tacos.

The variable of greatest interest for our study is the calorie posting indicator variable. One would expect for calorie posting to have a positive effect on lower calorie menu items and a negative effect on higher calorie menu items. Interestingly, in this analysis, the only menu item that calorie posting had a statistically significant effect on is the chicken soft tacos. The chicken soft tacos have fewer calories compared to beef soft tacos, but the difference is not large. The effect of calorie posting on the dessert item (Crustos) is negative but not statistically significant. For all other menu items, the effect is positive but not statistically different from zero. Especially of interest is the chicken lite taco, which is marketed as "lite" or low calorie. One might expect for demand for chicken lite tacos to increase after the calorie posting law went into effect. However, the effect of calorie posting is not statistically significant. It may be the case that the consumer who order the chicken lite taco are already aware of its calorie content, and thus, the posting of calorie does not significantly affect this product.

Calorie posting did not have a negative effect on Mexi Fries, which are a higher calorie side dish. It may be the case that consumers are ordering a slightly lower calorie main entrée, such as the Chicken Soft Taco with a side of Mexi Fries. This is similar to the "substitution effect" found by Teisl, Bockstael, and Levy (2001). Consumers choose

a chicken soft taco and then add Mexi Fries because they feel healthy about their main entrée.

In terms of the other variables, there is greater demand for most of the menu items in the summer months as expected, with the exception of chicken chili. In the summer months, more consumers are outside and likely to eat out. Chicken chili is a hot dish, which is less desirable in hot weather. The unemployment rate has a negative and statistically significant effect for most products. Average salary of the municipality has a positive effect on demand. The average age of the municipality has a negative effect, implying that if the average age is higher, demand for the menu items decreases. The population size increases demand and family size decreases demand. The latter variable may be related to effects of family budget constraints. Finally, the percentage of residents with at least a high school diploma decreases demand.

Conclusions

The impact of nutritional labeling on consumers demand has had mixed results, sometimes there is a shift and sometimes there is no significant impact. Restaurants have an incentive to provide consumers with what they want. If calorie posting shifts some of the demand to lower calorie menu items, then restaurants will respond accordingly. This study examined the effect of the King County, Washington, mandatory calorie posting law on demand for specific menu items at Taco Time quick service restaurants in King County.

From the current study, we find an increase in demand for chicken soft tacos after the calorie posting law went into effect. Chicken soft tacos are not the lowest calorie main entrée menu item. They are just a bit lower than the many of the alternatives. Consumers are considering many factors in their choice of what to eat, including health/calories and flavor. Another aspect to consider is that calorie posting may not have a major impact on some low-calorie menu items. A rationale for this result is that the consumers who are order the low-calorie item (e.g. the chicken lite taco) already know that it is low calorie compared to the alternative. Posting the calories does not add new information for these informed consumers.

From a policy perspective, we can conclude that the less nutritionally conscious consumers are likely benefit in a minor way from calorie posting laws, as long as the implementation is not too costly (resulting in higher prices).

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Table 1: Variable Descriptions and Summary Statistics

Variable	Description	Mean	Std. Dev.
Cksoft taco	Chicken soft tacos*	1312.35	452.62
Cklite taco	Chicken lite tacos	236.718	111.33
Mexifries	Mexifries (potato side item)	8416.718	2806.20
ChickenChili	Chicken Chili	710.47	263.73
Bfsofttaco	Beef soft tacos	2370.92	816.28
Crustos	Crustos (dessert item)	448.87	172.49
Summer	Indicates June-August	0.2137405	0.41
December	Indicates December	0.1068702	0.31
Calposting	Indicates Calorie Posting law in effect	0.37	0.48
Unemp	Unemployment rate in municipality the restaurant is located	0.060	0.02
Avgsalary	Unemployment rate in municipality the restaurant is located	$54,036	$20,449
Avgage	Average age in municipality the restaurant is located	37.63	3.70
Population	Population in municipality the restaurant is located	170,846	219,791
Familysize	Average Household size in municipality the restaurant is located	2.97	0.12
HSgrad	Percent of resident (>18 years) who are high school graduates in municipality the restaurant is located	89.89	4.18

*All observations of menu items are quantities of items sold are totals by restaurant and month.

Table 2: Semi-log Regression Results (standard errors in parentheses)

Variables	Beef Soft Tacos	Chicken Soft Tacos	Chicken Lite Tacos	Crustos	MexiFries	Chicken Chile
Constant	8.4902***	9.2359***	10.2053***	6.8461***	9.8558***	8.7202***
	(0.8295)	(0.8923)	(1.2014)	(0.8810)	(0.8090)	(0.9312)
Summer	0.4011**	0.0678***	-0.04277	0.0217	0.0393**	-0.0797***
	(0.0182)	(0.0196)	(0.0264)	(0.1933)	(0.0177)	(0.0204)
December	-0.0039	-0.0102	-0.0366	-0.0591**	-0.0073	-0.0039
	(0.0241)	(0.0259)	(0.0349)	(0.0256)	(0.0149)	(0.0270)
CalPosting	0.01036	0.0415**	0.01402	-0.0136	0.0090	0.0246
	(0.0153)	(0.0165)	(0.0221)	(0.0163)	(0.0149)	(0.0172)
Unemp	-2.5733**	-2.5667**	-2.2336	-4.0044***	-3.2733***	-2.5959**
	(1.1160)	(1.2005)	(1.6163)	(1.1852)	(1.0884)	(1.2528)
Avgsalary	2.44e-6	4.87e-6**	1.14e-5***	2.13e-6	4.23e-6**	5.53e-6***
	(1.87e-6)	(2.01e-6)	(2.70e-6)	(1.98e-6)	(1.82e-6)	(2.10e-6)
Avgage	-0.0465***	-0.0574***	-0.0814***	-0.0355***	-0.0513***	-0.0583***
	(0.0069)	(0.0074)	(0.0100)	(0.0073)	(0.0067)	(0.0078)
Population	3.50e-7***	3.35e-7***	-4.98e-8	3.69e-7***	4.52e-7***	3.45e-7***
	(7.97e-8)	(8.58e-8)	(1.15e-7)	(8.47e-8)	(7.78e-8)	(8.95e-8)
Familysize	-0.8407***	-1.2024***	-1.2109***	-0.5776***	-0.9459***	-0.9435***
	(0.1225)	(0.1318)	(0.1774)	(0.1301)	(0.1195)	(0.1375)
HSgrad	-0.0105**	-0.00678***	-0.0188***	-0.0121**	-0.0148***	-0.0122**
	(0.0047)	(0.0051)	(0.0068)	(0.0050)	(0.0046)	(0.0053)
R squared	0.2804	0.3347	0.3213	0.3234	0.2830	0.2469

*, **, *** denote statistical significance at the 0.1, 0.05, and 0.01 levels, respectively.
n =262