The Effect of Demographic, Economic, and Nutrition Factors on the Frequency of Food Away From Home

by

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Abstract

Food away from home, especially fast food, is often cited as contributing to rising obesity. This negative publicity can affect the demand for restaurant meals. In this study econometric models explaining visits to table service and fast food restaurants are estimated. The explanatory variables include not only standard demographic and economic measures but also measures of nutrition knowledge, attitudes, and concerns. Effects for the former are similar to those found in past studies. For nutrition factors, we find only limited impact for table service, but there is strong evidence that nutrition-orientated consumers tend to have lower fast food consumption.

Key words: FAFH demand, fast food, nutrition, negative binomial model.

The Effect of Demographic and Nutrition Factors on the Frequency of Food Away From Home

One of the largest changes in American eating habits in recent decades has been the increasing reliance on food eaten away from home (FAFH). FAFH has increase from 33% of total food expenditures in 1970 to 47% by 2003.[1] Most of this is at table service and fast food restaurants. Much of the growth is attributed to the rising value of household time, especially as induced by more female labor force participation, and rising household incomes. The importance of these factors has been shown in numerous studies (Prochaska and Schrimper; Redman; Kinsey; McCracken and Brandt; Yen; Byrne, Capps, and Saha). In addition, studies have consistently found that FAFH declines with household size, reflecting the scale economies associated with household meal preparation, and that women and older individuals of either sex are less likely to dine out. Separate analysis by type of facility has found different effects for some factors. For example, income is generally more important for table service, while convenience and accessibility have relatively greater influence for fast food (McCracken and Brandt; Jekanowski et al.).

Recently, the growth in FAFH has generated concern about its possible effect on dietary quality. There is considerable evidence that meals eaten in restaurants are generally of lower nutritional quality than meals eaten at home, mainly due to higher fat and calorie content (Lin and Frazao; McCrory et al.). Because obesity is now one of the nation's leading health problems, the nature of restaurant food has become a policy issue. Many observers believe that consumers make poor choices in restaurants owing to a lack of information. Proposals mandating that chain restaurants provide nutritional information on their menus have been

introduced in both houses of Congress. On another front, lawsuits have been filed by diners alleging that their obesity resulted from restaurant meals.

This public scrutiny has caused some restaurant chains to adopt proactive measures. More are providing nutritional information in various formats, and numerous new products geared to the nutrition-orientated consumer have been introduced, particularly by fast food chains. The success of these initiatives ultimately depends on acceptability by consumers. Although initial sales appear promising (New York Times, 2005), previous introductions of healthy menu options have not been highly successful. (*Consumer Reports*, 1996, 2004) One possible reason for this is that individuals concerned with nutrition are less inclined to dine out, perhaps due to the bad publicity–effectively negative advertising--directed at restaurant food.

Because of these considerations, a potentially important question is the extent to which nutrition concerns and dietary knowledge affect the decision to have a FAFH meal.

Although there have been several studies of the impact of nutrition factors on the demand for particular foods or nutrients (Brown and Schrader; Ippolito and Mathios; Chern, Loehman and Yen), restaurant dining has not been included. In this paper we do so with an econometric model. We use nutrition and diet data from the 1994-96 Continuing Survey of Food Intake by Individuals (CSFII) and the associated Diet and Health Knowledge Survey (DHKS). As with previous studies, we include demographic measures and measures of convenience, but we also include measures of nutrition knowledge and attitudes toward healthy eating.

Separate equations are estimated for fast food and table service restaurants. This is not only because of the differing effects of economic and demographic factors identified in previous

work, but also to permit differences for nutrition variables. Although FAFH is one of the most frequently cited factors behind the obesity epidemic, it is fast food that receives most of the criticism, especially in the popular media. Examples of this are Eric Schlosser's *Fast Food Nation* and in the well-received documentary *Supersize Me.* In a 2004 ABC News-Time Magazine poll, 43 percent of respondents thought that fast food bears a "great deal" of responsibility for the obesity crisis.[2] A likely reason for the different treatment is that most popular fast food items tend to be relatively high in fat and calories. Although the same items are available from table service restaurants, better-nutrition alternatives are also likely to be on the menu. In any case, this emphasis on fast food in the obesity and nutrition debate may have caused some consumers to avoid fast food when making dining choices.

Model and Data

Most studies involving FAFH are grounded on household production theory, and this study is no exception. As developed by Becker, household production theory views the household as both a consumer and producer of final goods, so that both household time and market produced goods enter the utility maximization process. This view is clearly relevant for food consumption, since meals can either be produced in the household using purchased inputs and household time or purchased ready-made at a restaurant. In addition, we recognize that health is an important final good to most consumers, and that they thus view food and good nutrition as inputs into health. This interdependency between food and health make food choice dependent not only on prices, income, and household time, but potentially also measures of nutrition knowledge and concern.

These considerations lead to a model of the following general form:

$$Y_i = f(P, I, T, H, D),$$

in which Y_i is a measure of household or individual food choice, P is a set of relevant prices, I represents household income, T involves measures of time cost, H is measures of nutrition concerns and knowledge, and D represents demographic and other factors. The latter can be viewed as proxies for taste and perhaps factors not captured by the variables in H.

This study uses the individual consumer as the observational unit . Y_i is the number of FAFH visits during a period of two days, where the days are at least three and not more than 10 days apart. Because the dependent variable is discrete, OLS is not an approptiate estimation procedure. A common way to address this problem is to view the process as poisson, i.e.

$$f(Y_i) = \frac{\epsilon^{\lambda_i} \lambda_i^{Y_i}}{Y_i!} \quad \text{for } Y_i = 0,1,2,...$$

The parameter λ_i is usually modeled as $\ln(\lambda_i) = X_i\beta$, where X is a set of explanatory variables affecting the probabilities for Y. (Greene p880). These models are easily estimated by maximum likelihood, based on the log-likelihood function

$$\ln L = \sum_{i=1}^{n} [-\lambda_i + Y_i \beta' X_i - \ln Y_i!].$$

However, a disadvantage of the poisson is that the variance and the mean are equal. This restriction is likely to be unrealistic for many economic processes, for the variance often exceeds

the mean, the "overdispersion" problem. Empirically it generally appears in the form of more zeros and more large values of Y than would be predicted by the poisson process.

A popular alternative to the poisson which is not subject to overdispersion is the negative binomial model. The negative binomial can be viewed as a poisson model with specification error, i.e.

$$\lambda_i = \exp(X_i\beta + \epsilon_i). \quad (1)$$

The error accounts for individual heterogeneity, as in the standard OLS case. Greene (p.886) illustrates that the distribution of Y conditional on ϵ is again poisson, and it can be straightforwardly estimated by maximum likelihood. It is the method employed in this study.[3]

Data

As stated above, the data for the study came from the 1994-96 CSFII and the accompanying DHKS. This is a nationally representative sample of noninstutionalized persons living in the US. The CSFII involves 16,103 individuals, most of whom supplied two nonconsecutive days of detailed dietary intake collected by trained in-person interviewers using 24-hour recalls. The nutrient intake lists the name of each food eaten, a detailed breakdown of its nutritional content, and where it was obtained and eaten. The data also includes demographic measures for the individuals surveyed and for their households. The DHKS is a follow-up telephone survey of 5765 individuals at least 20 years old who participated in the CSFII. Its purpose is to assess their knowledge of and attitudes toward nutrition and health.

Given the focus on the role of information and nutrition attitudes on the FAFH decision,

the sample was limited to those participating in the DHKS. Beginning with the 5765 participants, we eliminated those who did not provide intake data for both days. Additional observations were lost because some respondents failed to provide values for all variables. This left a sample of 4937 individuals, 2628 of whom had at least one FAFH visit during the sample period.

The food intake data is based on meal "occasions," defined as breakfast, brunch, lunch, dinner, supper, or snack. Our measure of a FAFH visit was an occasion with at least two food items obtained at a restaurant. Thus, stopping at a fast food outlet for a cup of coffee or a soft drink was not counted as a visit. The dependent variable in each equation is the total number of visits to the restaurant type in question by each individual.

Independent Variables

In table 1 are presented summary statistics for the sample of 4937 individuals. The independent variables can be broadly classed into two groups. One contains economic and demographic variables similar to those used in prior studies. The second involves measures related to nutrition.

Among the first are several variables related to money and time costs. Income is measured as per person household income, expected to positively affect the number of FAFH occasions. Because table service provides more amenities and greater variety, it should be more responsive to income, as found in previous work (e.g. Nayga and Capps; Byrne et al.). The CSFII data base has no direct measures of prices. We follow the usual practice of assuming that all respondents faced the same relative prices and to include regional variables to capture any

remaining cross-section differences. A dummy variable measuring whether the household is receiving food stamps is included. Because food stamps lowers the relative price of food at home, this is a type of price effect lowering demand for FAFH. Higher time cost is always found to increase the demand for FAFH; our measure of this is the number of hours per week usually worked by the respondent. An additional aspect of time cost is the availability and closeness of restaurants (Jekanowski et al.). We include urban-suburban-rural indicators to capture this. Those living in urban and suburban areas have lower accessibility costs than do rural residents, so FAFH usage should be higher. A variable also related to time cost is the size of household. Because of scale economies in household food preparation, the time cost per person by the meal preparer falls as household size increases, reducing FAFH usage. This has also been found in most studies.

The DHKS provided two price and cost measures. PRICEIMP is a binary variable measuring whether the respondent considers price "very important" when buying food. Consumers particularly concerned with price, the money cost, would be expected to make less use of the FAFH meal option, since it is usually more expensive than dining at home. The opposite applies to CONVENIENCE, an indicator measuring the importance of preparation time. Individuals who regard ease of preparation as very important have high time costs and thus are expected to dine out more frequently.

The model includes several demographic measures which can be broadly classified as related to taste and preferences. These involve ethnicity (African American and hispanic) , years of education, gender, and age. We regard the effect of ethnicity somewhat as an empirical question, although the balance of the evidence is that minorities make less use of FAFH.. It is

reasonable that more highly educated individuals make greater use of table service restaurants, due to food variety, but perhaps not fast food. It has been found that FAFH declines after middle age (Dong et al.;Nayga and Capps), so a negative sign is expected for age. Regarding gender, Nayga and Capps found that men dine out more. This agrees with a survey by the National Restaurant Association, which found that men consume an average of 4.6 commercially prepared meals per week, while for women the figure is 3.8 (*Restaurants, USA*).

As a measure of lifestyle, TV, the hours per day spent watching TV, is included in the model. People who watch a large amount of television are likely to spend a lot of time at home, reducing demand for FAFH. So a negative sign is expected. It is reasonable to expect that people are more likely to dine out on weekends than during the week. (Nayga and Capps; Dong et al.). We allow for this with three additional dummies: FRIDAY, SATURDAY, and SUNDAY. This allows separate effects for each of these, with a common effect for the remaining four days.

A final variable included in this group is the body mass index (BMI) of the respondent. If the main reason people become overweight is that they obtain above normal enjoyment from eating, particularly fatty, tasty foods, we might expect overweight people to have a greater demand for FAFH. Then being overweight. can be regarded as a 'cause' for dining out. On the other hand, many people believe that one reason for the obesity epidemic is the nation's increased reliance on FAFH. To the extent this view is valid, BMI is partly an endogenous variable. In spite of this, BMI is included in the model, mainly because we found that results for other variables were insensitive to whether it was present.[4]

The remaining variables in the table are those measuring nutrition factors. Most are binary in nature. Variable choice was based on factors deemed likely to affect the dining out decision and measures potentially related to policy issues. In many cases the direction of effect is not necessarily obvious a priori. Some ambiguity is inevitable, given the exploratory nature of the study and the fact that these variables are not observational measures, but survey responses. However, under a maintained hypothesis that, relative to food at home, restaurant meals are high in fat and calories, it is reasonable to expect that variables associated with 'good' dietary practice and a higher regard for nutrition and health would have negative signs in our models.

Six variables describe current dietary behavior. DIET indicates whether the respondent is on any kind of diet. Because dining away from home reduces the individual's control of food ingredients, a negative sign is expected. The same is true of VEGETARIAN, since meatless FAFH options, while certainly available, are usually somewhat limited, especially for fast food. PRODUCE, taken from the CSFII, is a measure of fruit and vegetable consumption. Respondents were asked 23 questions of the form "In the last twelve months, did you eat ___?", where the blank contained a fruit or vegetable.[5] PRODUCE is the number of affirmatives. It is a measure of taste for fruits and vegetables and preference for nutritious foods, so a negative sign is expected.

DISFAT and SUBFAT indicate whether respondents avoid adding discretionary fat and whether they substitute lowfat versions of foods, respectively. Larger values indicate an inclination to do so. Low fat substitution possibilities in restaurants may be limited, and the 'discretionary' fat may be added before the food is served. Thus, individuals who normally restrict discretionary fat and/or make low-fat food substitutions may be less inclined to dine out.

Hence negative signs are expected. The last diet behavior variable is PORTION, a dummy indicating that when the respondent eats meat, the portion is usually large. If restaurant portions are indeed "supersized," we would expect consumers who prefer large portions to be more prone to FAFH.

The model includes five variables measuring whether certain aspects of diet/health are "very important." These are NUTRITION (nutrition when food shopping), HLTHYWT (maintaining a healthy weight) , LOWFAT (maintaining a diet low in fat), FRTVEG (getting adequate amounts of fruit and vegetables), and TASTE (taste when food shopping). The first four are positively related to nutrition and thus are expected to have negative signs; TASTE is expected to be positive.

The remaining variables are measures associated with nutrition knowledge. LABEL measures whether the respondent currently uses food labels with frequency. If this is found to be related to FAFH demand it can help to assess the potential value of menu labels. Perhaps the most reasonable expectation is a negative effect. Presumably, label users desire a healthy diet, and with the general belief that FAFH is substandard in nutrition, they might avoid restaurants. The same applies to a related variable, USEWELL, which indicates the respondent has high confidence in her/his ability to use labels to choose a healthy diet.

NUTSCORE is the number of correct answers to fourteen specific questions about nutritional characteristics of foods.[6] A consumer with high nutrition knowledge (and who desires a nutritious diet) may avoid FAFH because it tends to be less healthy, thus generating a negative effect. But such an individual may have greater ability to navigate the menu and avoid nutrition

pitfalls, reducing concern that FAFH will lower diet quality. Then dining out may be more likely.

SENSE is an indicator variable equaling 1 when the individual strongly agrees with the statement "Choosing a healthy diet is just a matter of knowing what is good and what is bad." Although this is essentially a truism, we interpret it as expressing the sentiment that what is needed to have a healthy diet are common sense rules, such as "avoid fat" and "eat lots of fruit and vegetables," not detailed nutrition knowledge, such as that measured by NUTSCORE [7]. Given the negative publicity about the nutrition of FAFH, one might expect a negative effect. On the other hand, such a viewpoint may simply be a rationalization for not making the effort to obtain specific information.

A similar variable is NOCHANGE, which has value 1 if the individual strongly believes that their current diet is healthy and requires no change. We interpret this as indicating the respondent believes they make no serious nutritional missteps, not that their current diet has achieved perfection. If this self-assessment is accurate, then an expectation of reduced likelihood of dining out is reasonable. However, Variyam et al. (2001) found that people believing their diet needed no improvement were often mistaken.

Results

The results for the two estimated models appear in table 4. Of the six variables associated with the money or time cost of FAFH relative to home meals---INCOME, HHSIZE, EMPLOY, FOODSTAMPS, PRICEIMP, and CONVENIENCE , all are highly significant for table service ($p=.01$), with expected signs; estimates for fast food are similar, but except for

HOURS, significance is generally lower and coefficients smaller in absolute magnitude. Income is not significant. These results reflect the lower price of fast food.

Although age has a negative effect in both equations, it is not significant for table service but very highly significant for fast food. Gender is negative and highly significant for both restaurant types, indicating that women dine out less than men. Years of education has a positive effect but it is only significant for table service, and only at the 10 percent level. The only strong racial effect in these models is that blacks are estimated to be less likely to dine at table service facilities. Our view that the TV variable is a measure of a stay-at-home lifestyle is bourne out by the results: the coefficient is negative and highly significant in both models.

Like earlier studies, we find a weekend effect, but our estimates differ among weekend days. According to the results, a table service meal is much more likely to occur on a Friday than on any other day. Fast food usage appears to be more evenly distributed through the week, with only a modest tendency to be greater on Saturday.

Also as in earlier studies, we find that rural consumers are significantly less likely to use fast food than are those in suburban areas (the omitted class), while urban consumers make greater use of table service. Both of these reflect the importance of facility availability. Regional measures have little effect, the only one of note being that Southern consumers make greater use of fast food. Perhaps the proliferation of restaurant and fast food chains throughout the US has eliminated most regional differences.

In each case the coefficient on BMI is positive and significant, which is evidence that overweight individuals are more likely to dine out than are others. When they do, they are

estimated to be more likely to choose table service, for its coefficient is larger and more highly significant. Assuming that one reason people become overweight is an above average liking for eating, this could reflect the greater variety and perhaps palatability found at table service restaurants relative to fast food. It could also be that, fast food supersizing notwithstanding, buffet style and frequent all-you-can-eat offers at table service outlets provides a better value for anyone interested in eating large meals. To the extent there is reverse causality, the result also suggests that dining in table service restaurants is a greater source of excess weight. In any case, it is evidence that fast food is not the only factor in the FAFH-obesity question.

Nutrition Variables

We now consider the nutrition-related variables, beginning with those describing the current diet of the respondent. DIET, measuring whether the respondent reports being on any kind of diet, is not significant in either equation.. Although this is somewhat surprising, Nayga and Capps obtained the same result in their study. However, VEGETARIAN, which is certainly a type of 'diet,' is negative in both cases and highly significant in the fast food model. Most fast food menus are built around a small number of meat-based items, making them of limited interest to vegetarians. Table service, which often provides vegetarian entrees, is less affected. For fast food, PRODUCE, the measure of fruit and vegetable consumption, also has a negative effect, with almost identical significance. But this time the coefficient for table service is significantly positive. A possible reason for this somewhat unexpected sign is that PRODUCE is measuring not only a desire for fruits and vegetables but a preference for variety as well, which we would expect to be positively associated with dining in table service restaurants.

DISFAT and SUBFAT measure the degree to which the respondent makes an effort to avoid fat, by either not adding discretionary fat in the first place and/or by substituting low fat foods for standard counterparts. Neither is significant for table service. For fast food, SUBFAT is not significant, while DISFAT has a very highly significant positive effect. This difference for these apparently related variables suggests they are distinguishing between two consumer types. One is those who avoid discretionary fat not only for nutrition considerations but also because they simply do not care for foods higher in fat. Since this seems to characterize fast food, they would dine out less. The second is the group who enjoys high fat foods–and thus FAFH-- but also worries about nutrition and so is willing to make substitutions when the sacrifice is not too onerous.

The variable PORTION is completely lacking in significance in both equations. In this sample, those stating they normally eat large meat portions are no more likely to dine out than those who do not. This absence of impact is interesting in view of the importance assigned to large portions in encouraging excess food consumption at restaurants, especially fast food.

Results for the group of variables measuring the importance respondents claimed for aspects of nutrition were generally disappointing. NUTRITION and TASTE indicate whether the characteristics in question are deemed 'very important'. We expecteded consumers ranking food taste as very important to be more inclined to dine out, with the opposite effect for nutrition. However, these expectations failed to materialize, for both variables are estimated to have no effect whatsoever in either equation. In both models LOWFAT and HLTHYWT, measuring the importance of a low fat diet and maintaining a healthy weight, have the wrong sign. More problematic, for fast food HLTHYWT is sigificant at .05. A strict interpretation is that having

the view that a healthy weight is very important induces people to eat at fast food restaurants. This is very difficult to accept. Either the result is capturing some problem of specification–an omitted variable, for example, or it is simply a type I error. Furthermore, actual behavior does not always accord with what consumers regard as important, due to a failure of will, lack of knowledge, and other reasons. Note from table 2 that 75 percent of the sample strongly agreed with the statement that healthy weight is very important. Nevertheless, according to the Centers for Disease Control, in 1994 56 percent of adults over 20 were overweight.[8] (National Center for Health Statistics, 2004.)

PRODUCE, measuring the importance of fruits and vegetables, is the only member of this group whose effect is as expected. It is negative in both equations, and highly significant for fast food. Given similar results for PRODUCE and VEGETARIAN, we conclude that the unavailability of fruit and vegetable items restricts the customer base of fast food outlets. This agrees with other evidence. A recent survey found that more than twice as many fast food than table service customers said they would eat out more often if more fruits and vegetables were offered. (*QSR Magazine*).

Of the information variables, NUTSCORE is the most direct measure, being the score on a nutrition test. According to the results, respondents with a higher score are (insignificantly) less likely to use fast food and significantly more likely to dine at table service restaurants. Accepting that higher knowledge implies a desire for a healthy diet, the difference in the two coefficients makes sense. Someone alert to the nutritional properties of various foods will be able to find reasonably healthy items among the variety of table service dishes available, certainly more so than with the limited selections at a fast food outlet.

LABELUSE is insignificant in both models, meaning that food label users are neither more nor less likely to dine out than non-users. However, those who believe they know how to use labels to choose healthy foods, measured by USEWELL, are significantly less likely to eat fast food. This is additional evidence of a negative correlation between nutrition concern and fast food use.

We regard SENSE as indicating that nutrition choices are based on broad rules of thumb rather than punctilious attention to details. In view of the negative publicity regarding FAFH nutrition, one such rule is likely to be "other things the same, avoid discretionary dining out." The results support this: the coefficient on SENSE is negative for both FAFH types, and significant for fast food. Much the same argument applies to NOCHANGE, the indicator that the respondent believes his/her current diet is healthy, which also has a negative effect in both cases, each more significant than SENSE. Although our interpretation of these variables may be considered hypothetical, less dining out would probably be viewed as evidence of good nutrition behavior.

Practical Effects

The coefficients in table 4 are not direct effects, because they refer to the nonlinear equation for the expected number of FAFH visits in (1). The ith marginal effect is $\beta_i e^{X\beta}$, which depends on the values of all the variables. A typical point of evaluation is the point $\bar{X}$. However, rather than marginal effects, it is more interesting to consider selected discrete changes in each of the k variables, using the difference formula

$$\Delta_i = e^{X_c\beta} - e^{X_b\beta} \quad \text{i=1 to k.}$$

For continuous variables, X_b is the vector of sample means (including sample means of binary variables) and X_c is X_b with the i^{th} position increased by one standard deviation of x_i. That is, we predicted the effect of a one standard deviation increase in x_i on predicted visits taken at the mean of other variables. For binary variables, X_b was again the vector of means except that the i^{th} position was replaced with a zero. For X_c, the same vector was used, except the i^{th} position was 1. This is the predicted difference in visits when the characteristic is present versus when it is not, again taken at the means. Since these effects refer to a period of two days, they were multiplied by 15 , making them monthly differences.

These appear in table 4. From this we see, for example, that being on food stamps is associated with four fewer FAFH visits per month, three tables service and one fast food, while price-conscious food shoppers make two fewer. Increasing age by one standard deviation from the mean (i.e. from 49 to 65 [table 1]) results in a reduction of 1.5 fast food visits. The predicted male-female difference of 3.1 per month compares remarkably well with the .8 weekly difference found by the National Restaurant Association Survey noted previously.

Fast Food vs. Table Service

A purpose of the study was to test whether nutrition factors have a greater impact for fast food than for table service. Based on the number of significant coefficients, they do. On balance, the pattern suggests that consumers with better dietary practices are less likely to dine at

fast food outlets. There is little evidence of any similar effect for table service demand.

To address this more formally, the variables were classified into two sets: 14 nutrition and diet variables, and the remaining 22 variables. ONDIET and VEGETARIAN were included in the latter group, the first because it is often not a choice variable and the second because of its low prevalence in the sample. We then conducted a likelihood ratio test of the significance of each group in each equation. These appear in table 5, which shows that the likelihood ratio statistic for the 'other' group is of about the same magnitude in each equation, both highly significant. In either case it is considerably larger than the statistic for the nutrition group, indicating that economic and demographic factors are more important than nutrition measures in explaining differences in FAFH demand. However, it is evident that the difference in the fast food equation is much smaller, suggesting a much larger role for nutrition factors in the fast food decision.

To illustrate the potential consequences of this difference, we used the estimated equation to compare the predicted mean outcomes for two hypothetical consumers, one with high and one with low nutrition concerns/interest/behavior, where these are defined by values of the 14 nutrition-related variables. In the case of the 'high' consumer, all binaries are set at 1, except TASTE and PORTION , set at 0; non-binary nutrition variables are set at their 75^{th} percentile value. For the 'low' consumer, all binaries are reversed, and the continuous measures set at the 25^{th} percentile. In both cases the remaining variables are at their sample means. Based on equation (1), a two-standard deviation confidence interval was constructed for mean visits by each consumer type to each type of restaurant.

These appear in table 6. For table service, there is virtually no difference between the consumer types, with the high nutrition consumer slightly more inclined to visit a table service restaurant. It is quite the contrary for fast food: the intervals have no overlap, with much smaller values for high nutrition.[9] The means imply that on a monthly basis, the typical low nutrition consumer makes nearly eight fast food visits, versus less than five for the consumer with high nutrition. Comparing the columns, the two intervals for high nutrition do not overlap, with fast food much to the left. Those for low nutrition have considerable overlap, with the fast food interval being somewhat to the right. In other words, consumers with high nutrition concerns are much more likely to choose table service, while those with no such concerns are somewhat more inclined to fast food. Finally, the intervals imply that a typical low nutrition consumer makes 15 FAFH vists per month, compared to less than 12.5 for those characterized by high nutrition, primarily due to less use of fast food.

Concluding Remarks

In this paper we have examined a question that has been studied several times over the past three decades: the factors behind the decision to dine away from home. The study differs from previous work by including variables measuring nutrition attitudes and knowledge as well as demographic and economic factors. Restaurants tend to feature meals of lower nutritional value than meals prepared at home, and restaurant food is often linked to the growing obesity problem, especially fast food. Thus, the hypothesis examined is that consumers concerned with nutrition are less likely to dine out, with fast food particularly affected.

We found support for this. Although the variables that have been found most important

in prior studies, such as income, time value, age, and gender, continue to play the primary role in FAFH demand, our results show it is influenced by nutrition concerns as well. The effect is much more pronounced for fast food, and more consistent in direction. Nutrition-focused consumers make fewer visits to fast food outlets. In the case of table service, nutrition is less of a factor, and the direction of effect is ambiguous: if anything it appears to be more positive than negative.

Our conclusion is that negative publicity regarding the nutritional effects of FAFH has adversely affected the demand for fast food, but the effect on table service has been inconsequential. This is not a surprising result, for fast food has become a symbol of high fat, low nutrition dining. While this may well be justified, that consumers obtain better nutrition at table service restaurants has not been demonstrated. Indeed, the limited information available suggests little difference, with table service possibly worse (Lin and Frazao; Binkley). Certainly the issue needs clarification. If table service is no better, consumers may mistakenly believe that as long as they avoid fast food, they need not be greatly concerned with their diet when dining out.

A final point relates to implications for the industry. According to a recent USDA study, demographic trends do not favor the fast food sector. Because of the aging of the population; rising incomes; and the continuing decline in household size, demand for table service meals will grow faster than fast food demand (Stewart et al.). Our results for these variables support this. In addition, if nutritional concerns continue to grow, which they seem likely to do, the results of this study suggest the shift to table service may be yet stronger than that predicted by the USDA. However, our results also suggest that the recent addition of fruit and salad items to fast food menus is likely to counteract these trends.

Endnotes

1. http://www.ers.usda.gov/briefing/CPIFoodAndExpenditures/

2. The attitude that fast food is particularly bad is also present in the academic literature. Many studies of the dietary impacts of FAFH are confined to fast food (e.g. Bowman**;** Paeratakul, et al.).

3.For more details on the method see Dong et al.

4.Also, all individuals who dine out frequently do not become overweight. This implies that anyone who does gain weight due to dining out is doing something different from others, e.g. choosing fattier foods or eating more. That is, ultimately it is due to diners' choice. We also note that BMI has been used in similar studies. (eg Wilde et al;Variyam, Blaylock, and Smallwood, 1996.) McCrory et al. Found a positive correlation between restaurant dining and body fatness.

5.The twenty three are artichokes, asparagus, broccoli, brussels sprouts, cauliflower, eggplant, kale, swiss chard, okra, spinach, summer squash, winter squash, yams, turnips, avocado, grapefruit, cantaloupe, honeydew, watermelon, nectarines, pears, plums, and rhubarb.

6.A typical question is "Based on your knowledge, which has more saturated fat: butter, or margarine"?

7.This attitude is exemplified by a respondent in a 2004 *NY Times* survey on food label usage. "I don't need to read nutrition labels closely to know doughnuts are bad for me...I just sort of know what would be good and what wouldn't."

8.Of course some individuals may become more aware of the importance of a healthy weight when they themselves become overweight.

9.Note this is despite the perverse sign for the coefficient on HLTHYWT.

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Table 1. Variables used in the analysis.

VARIABLE	DESCRIPTION	mean	stdev	min	max
OCC2	Table service visits	0.517	0.818	0	6
OCC3	Fast food visits	0.458	0.754	0	5
INCOME	Per capita household income (1000's dollars)	17.098	14.097	0	100
HOURS	Usual hours worked/ week	25.675	22.513	0	91
HHSIZE	Household Size	2.582	1.397	1	16
FOODSTAMPS	1=Food Stamp eligible	0.066	0.248	0	1
PRICEIMP	1=Price very important when food shopping	0.447	0.497	0	1
CONVENIENCE	1=Convenience very important when food shopping	0.386	0.487	0	1
AGE	Age in years	49.272	16.708	20	90
GENDER	1=Female	0.499	0.500	0	1
EDUCATION	Years of education	13.025	2.821	0	17
AFRICAMER	1=African-American	0.115	0.319	0	1
HISPANIC	1=Hispanic	0.065	0.247	0	1
TV	Hours per day	2.560	2.065	0	19.5
FRIDAY	Number of Fridays in the two interview days	0.288	0.464	0	2
SATURDAY	Number of Saturdays in the two interview days	0.206	0.410	0	2
SUNDAY	Number of Sundays in the two interview days	0.334	0.477	0	2
RURAL	1=Lives in rural area[1]	0.255	0.436	0	1
URBAN	1=Lives in urban area[1]	0.301	0.459	0	1
EAST	1=East region	0.192	0.394	0	1
SOUTH	1=South region	0.351	0.477	0	1
MIDWEST	1=Midwest region	0.262	0.440	0	1
BMI	Body mass index	26.387	4.943	15.19	45.91
DIET	1=On any kind of diet	0.189	0.391	0	1
VEGETARIAN	1=Vegetarian	0.029	0.169	0	1
PRODUCE	Number of 23 types of fruits & veg eaten in last year	12.516	4.574	0	23
DISFAT	1=Usually avoids discretionary fat	2.371	0.613	1	4
SUBFAT	1=Often substitutes lowfat for regular foods	2.394	0.736	1	4
TASTE	1=Taste is very important when food shopping	0.840	0.367	0	1
NUTRITION	1=Nutrition is very important when food shopping	0.644	0.479	0	1
HLTHYWT	1=Very important to maintain a healthy weight	0.743	0.437	0	1
LOWFAT	1=Very important for diet to be low in fat	0.597	0.490	0	1
FRTVEG	1=Very important to eat lots of fruit and vegetables	0.686	0.464	0	1
PORTION	1=Do not choose large portion sizes of meat	0.893	0.309	0	1
NUTSCORE	Number correct of 14 nutrition questions	8.851	2.336	0	14
LABEL	1=Frequently uses nutrition labels	0.326	0.469	0	1
USEWELL	1=Knows how to use labels for nutritious diet	0.225	0.418	0	1
SENSE	1=Healthy diet just requires knowing what's good &bad	0.395	0.489	0	1
NOCHANGE	1=My diet is healthy and requires no changes	0.172	0.377	0	1

[1]Suburban is reference

Table 2. Poisson Regression Results

	TABLE SERVICE		FAST FOOD	
	Estimate	ChiSq	Estimate	ChiSq
INTERCEPT	-1.234	14.41	1.017	9.74***
INCOME	0.007	17.55***	0.001	0.42
HOURS	0.005	19.06***	0.006	19.29***
HHSIZE	-0.058	8.85***	-0.032	2.81*
FOODSTAMPS	-0.519	13.49***	-0.201	3.17*
PRICEIMP	-0.168	11.38***	-0.122	5.72**
CONVENIENCE	0.145	9.62***	0.108	5.02**
AGE	-0.003	2.76*	-0.017	90.06***
GENDER	-0.168	11.84***	-0.232	20.53***
EDUCATION	0.019	3.46*	-0.002	0.04
AFRIAMER	-0.218	6.30**	0.055	0.48
HISPANIC	-0.093	0.85	0.137	2.21
TV	-0.074	29.84***	-0.060	20.10***
FRIDAY	0.191	15.85***	0.071	1.96
SATURDAY	0.004	0.00	0.104	3.55*
SUNDAY	0.006	0.01	0.004	0.01
RURAL	-0.055	0.90	-0.133	4.86**
URBAN	0.096	3.22*	0.009	0.03
EAST	0.079	1.24	0.002	0.00
SOUTH	-0.035	0.31	0.097	2.14
MIDWEST	0.017	0.07	0.049	0.47
BMI	0.018	14.33***	0.012	6.24**
DIET	-0.022	0.14	-0.033	0.24
VEGETARIAN	-0.079	0.31	-0.550	8.51***
PRODUCE	0.011	4.31**	-0.017	8.77***
DISFAT	-0.058	1.93	-0.201	20.45***
SUBFAT	0.015	0.16	-0.023	0.32
TASTE	0.007	0.01	-0.050	0.63
NUTRITION	-0.028	0.29	-0.018	0.12
HLTHYWT	0.058	0.98	0.125	4.39**
LOWFAT	-0.037	0.46	-0.012	0.05
FRTVEG	-0.056	1.04	-0.146	7.00***

PORTION	0.031	0.18	0.005	0.01
NUTSCORE	0.024	4.97**	-0.007	0.46
LABELUSE	0.051	0.87	-0.046	0.67
USEWELL	-0.003	0.00	-0.138	5.06**
SENSE	-0.062	1.65	-0.118	5.50**
NOCHANGE	-0.129	3.48*	-0.190	6.19***
R^2	.083		.099	

*Significant at .10; **Significant at .05; ***Significant at .01.

R2 is ncalculated as the squared correlation between the actual and predicted value of the dependent variable.

Table 3. Effect of a One Standard Deviation Change in Indicated Variable on Monthly FAFH Visits

	Table Service	Fast Food
INCOME	0.760 [a]	0.111
HOURS	0.902	0.807
HHSIZE	-0.543	-0.259
FOODSTAMPS	-2.919	-1.093
PRICEIMP	-1.160	-0.719
CONVENIENCE	1.031	0.652
AGE	-0.335	-1.502
GENDER	-1.384	-1.740
EDUCATION	0.375	-0.034
AFRICAMER	-1.399	0.333
HISPANIC	-0.625	0.861
TV	-0.990	-0.693
FRIDAY	1.385	0.425
SATURDAY	0.026	0.638
SUNDAY	0.039	0.027
RURAL	-0.378	-0.764
URBAN	0.679	0.054
EAST	0.564	0.010
SOUTH	-0.245	0.586
MIDWEST	0.120	0.293
BMI	0.663	0.373
DIET	-0.156	-0.195
VEGETARIAN	-0.529	-2.552
PRODUCE	0.374	-0.432
DISFAT	-0.243	-0.689
SUBFAT	0.080	-0.099

TASTE	0.046	-0.302
NUTRITION	-0.193	-0.106
HLTHYWT	0.395	0.722
LOWFAT	-0.258	-0.071
FRTVEG	-0.391	-0.889
PORTION	0.212	0.032
NUTSCORE	0.401	-0.102
LABELUSE	0.361	-0.271
USEWELL	-0.021	-0.790
SENSE	-0.427	-0.689
NOCHANGE	-0.864	-1.063

[a] Bold indicates coefficient significant at .10 or better.

Table 4. Results of Chi-Square Tests (Prob values in parentheses)

	TABLE SERVICE	FAST FOOD
ECONOMIC & DEMOGRAPHIC	324.78 (.000)	335.55 (.000)
NUTRITION	25.06 (.034)	76.91 (.000)

Table 5. Two-Standard Deviation Confidence Intervals for Mean Two-Day Visits by "Low Nutrition" and "High Nutrition" Consumers.

CONSUMER TYPE	TABLE SERVICE			FAST FOOD		
	lower	mean	upper	lower	mean	upper
LOW NUTRITION	.385	.466	.564	.429	.520	.630
HIGH NUTRITION	.405	.486	.583	.274	.332	.402