The Effect of Restaurant Calorie Labeling on Dietary Intake

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Abstract: The Affordable Care Act mandated that the FDA create rules regarding the posting of calorie information in restaurants. The rationale is that providing calorie information at the point of sale can help consumers make healthier choices, as it is assumed that a lack of information about caloric content is one barrier to reducing caloric consumption when eating food prepared away from home (FAFH). In certain areas of the U.S., chain restaurants already provide point-of-sale calorie information to consumers in response to local and State mandatory calorie labeling regulations that pre-dated the national law. Using 2003-2014 National Health and Nutrition Examination Survey data, our study estimates the overall impact that these local and State mandates have had on the relationship between FAFH and caloric intake. We use two days of dietary intake data to estimate the effect of each FAFH meal on total daily calories and to test whether the effect of FAFH on total daily calories is smaller in locations with menu labeling laws. We leverage geographic data on the density of FAFH outlets and food-at-home retailers in a respondent's area to select comparison group for individuals in areas with menu labeling laws and to test whether the impacts are more pronounced in areas with a higher concentration of chain restaurants. The relationship between FAFH consumption and caloric intake may capture actions taken by both consumers (e.g. choosing lower-calorie meals in restaurants) and producers (e.g. reformulating meals to reduce caloric contents). We also analyze the impact of existing menu labeling laws on consumers' use of nutrition information in restaurants and their frequency of FAFH consumption.

Keywords: Menu Labeling, Food Away From Home, Dietary Intake, Calorie Labeling, Restaurants

1. Economic Research Service, USDA
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Introduction

Food prepared away from home (FAFH) has been documented to be of lower nutritional quality than food prepared at home (Lin and Guthrie, 2012) and its consumption has been found to increase daily caloric intake and lower diet quality among adults (Mancino et al., 2009). The national menu labeling provision set forth in the Affordable Care Act will require that restaurants and other establishments that sell FAFH provide consumers with calorie information at the point of purchase. The Food and Drug Administration (FDA) developed the final regulations, which is scheduled to take effect on May 5, 2018. Beginning in 2008, some States and localities implemented their own regulations, and some chains voluntarily posted calorie and other nutritional information on menus.

Many studies have estimated the impact that State and local menu labeling laws have had on calories purchased per meal in restaurants, but systematic reviews of the studies on the impact of menu labeling prior to 2016 find that little is known about the impact of calorie labeling on total daily caloric intake, diet quality, and body weight (Long et al., 2015; Littlewood et al., 2015). Most recently, Restrepo (2016) found that local calorie labeling laws in New York City and several other New York counties reduced BMI by 1.5 percent and the probability of obesity by 12 percent, on average. However, the mechanisms through which these laws reduced body weight are unknown. Using the same data set that was used to track changes in obesity, Restrepo was only able to track changes in physical activity and the consumption of alcohol, fruit, and

vegetables—foods which account for only 15% of total energy intake (Block, 2004) — and found that the roll-out of these local NY laws had small and statistically insignificant impacts.

In this paper, we estimate the impact of menu labeling laws on the relationship between FAFH consumption and total daily caloric intakes of individuals by comparing the relationship among those living in areas with mandatory calorie labeling laws relative to a matched comparison sample of individuals living in areas without a law, but with similar food environments and observable individual and household characteristics.

Motivation and Theoretical Framework

Individuals who consume FAFH tend to have higher caloric intake and lower diet quality (probably need a citation—will lift from older study). However, a simple comparison of dietary outcomes across FAFH consumers and those who do not consume FAFH does not necessarily imply that FAFH causes higher caloric intake and lower diet quality. Individuals who prefer higher-calorie foods may also be more likely to consume FAFH and therefore the differences in caloric intake and diet quality could reflect differences in preferences, as well as differences in the source of the food. Todd et al. (2010) separate the effect of FAFH consumption on caloric intake from individual preferences and find that each FAFH meal increases daily caloric intake by 134 calories among adults, on average.

There are two main channels through which calorie labeling in restaurants can affect how FAFH impacts daily caloric intake. The first is a direct effect, where consumers use the calorie information to choose lower-calorie menu items or to consume a smaller amount. They may also use the calorie information for the foods they purchase to help manage their caloric intake at other meals throughout the day. The second is an indirect effect, where restaurants respond to the

mandate to provide calorie information on menus by reformulating or resizing their menu items in order to reduce their caloric content. This would lower the average caloric content of items served in restaurants and, even if an individual is not trying to reduce caloric intake, would lower average calories consumed as well. In addition to these effects of FAFH on daily caloric intake, calorie labeling could also affect the frequency with which individuals eat away from home. Taken together, all of these regulation-induced effects could result in lower total daily intake of calories which, in turn, could reduce body weight.

Our primary goal is to estimate the net effect of local and State menu labeling laws on the relationship between FAFH consumption and caloric intake and diet quality. To achieve this goal, we will exploit the fact that we observe dietary information at 2 points in time for NHANES respondents and use the first-difference estimation approach outlined in Todd et al. (2010), which controls for all time-constant heterogeneity at the individual level. As noted above, the relationship between FAFH consumption and caloric intake and diet quality can reflect both consumer-driven and producer-driven responses.

The impact of menu labeling is likely to vary according to an individual's exposure to calorie information as measured by both proximity to the chain restaurants that are required to post calorie information on menus and the length of time the mandate has been in place. For example, individuals may be most responsive to the information when the information is initially posted and may become desensitized to it over time. Alternatively, if it takes repeated exposure for consumers to understand the new information, the informational effects may grow as exposure increases over time. The FDA estimated that there would be 298,600 total establishments, including grocery stores that serve prepared food (from a total of 2,130 chains) that would be covered by the national menu labeling law (Food and Drug Administration, 2014).

These establishments are not spread uniformly across the country or in uniform proximity to the population. If the effect of the law depends on an individual's exposure to the information, then the benefits to public health will also vary across the U.S. The primary and secondary estimation approaches discussed above will investigate whether the effect of menu labeling is greater in areas with higher concentrations of restaurants covered by the law (chain restaurants), as well as whether the effect increases or lessens the longer the law has been in place.

Empirical Approach

To study the effect of menu labeling on the effect of FAFH consumption on dietary intake, we employ the approach used by Todd et al. (2010), which regresses the change in intake between two days on changes in meal patterns between the 2 days and other factors that affect daily intake (such as day of week).

Because the States and localities that adopted menu labeling laws prior to the national mandate are likely to be different from those that did not adopt such policies, we will limit the sample of individuals in areas that do not adopt a menu labeling law by matching them to individuals in areas that adopt the law based on observable individual and household-level characteristics, such as income and county-level obesity rates, as well as on their observable food environment. In essence, we construct a comparison group of individuals that are most like the individuals we observe in areas with menu labeling laws. This will minimize any differences in factors related to caloric intake, diet quality, and their relationship to FAFH consumption between individuals with and without labeling laws.

Our identification of the effect of menu labeling laws will rely on the variation in time when laws were introduced and when an individual is observed in the sample, and variation in

the share of restaurants around the individual's home that must comply with the law. We will first estimate a model where the change in FAFH consumption is interacted with an indicator for the menu labeling policy being in effect.

$$\Delta DQ_i = \gamma_0(\Delta FAFH_i) + \gamma_1(\Delta FAFH_i)(MenuLaw_i) + \alpha(\Delta Meals_i) + \beta(\Delta weekend_i) + \Delta\varepsilon_i \quad (1)$$

In equation 1, $FAFH_i$ indicates the number of meals consumed from FAFH in the day, MenuLaw is an indicator variable taking on a value of 1 if the individual is observed when a menu law is in effect in their home tract and 0 otherwise. Taking the difference in intake between the two days of intake (ΔDQ_i) removes the effect of time-invariant observed characteristics (e.g., age, gender, household size, year, county) and unobserved characteristics (e.g., food preferences and dietary knowledge) from the remaining parameter estimates. We also account for other factors that affect total daily caloric intake and diet quality, such as changes in meal patterns ($\Delta MEAL_{ij}$) and whether the recall day was on a weekend ($\Delta weekend_i$). Thus, γ_0 provides an estimate of the average effect of obtaining one additional meal from FAFH on diet quality when a menu law is not in effect, and γ_1 provides an estimate of the difference in FAFH's effect on the DQ measure when the law is in effect.

We expect the effect of a menu labeling law to depend on how often an individual is likely to see the menu information, which in turn depends on the percent of restaurants around the individual that must comply with the law (Chain%).

$$\begin{aligned}\Delta DQ_i = {} & \gamma_0(\Delta FAFH_i) + \gamma_1(\Delta FAFH_i)(MenuLaw_i) + \gamma_2(\Delta FAFH_i)(Chain\%_i) \\ & + \gamma_3(\Delta FAFH_i)(Chain\%_i)(MenuLaw_i) + \alpha(\Delta Meals_i) + \beta(\Delta weekend_i) + \Delta\varepsilon_i\end{aligned} \quad (2)$$

In equation 2, γ_1 estimates the effect of the Menu law on how FAFH affects caloric intake or diet quality for the day when there are zero chain restaurants around an individual's home, and γ_2 estimates the additional effect on the effect of FAFH for a one unit increase in the percent of chain restaurants around an individual. Finally, γ_3 estimates the additional effect of the Menu Law for each one unit increase in the percent of chain restaurants.

Recognizing that the effect of the law may vary over time since the law has been in place, we will also replace the MenuLaw indicator variable with a continuous measure of time since the law has been in effect—MenuTime (e.g. months, quarters, years). To allow the effect to be nonlinear, we replace the MenuTime variable with a set of indicators for being within the first year after implementation or more than 1 year (as well as other cut-offs, for example, within 2 years or more than 2 years).

Results

NOT YET AVAILABLE

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