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Value of parsimonious nutritional information in a framed field experiment

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ABSTRACT

This study investigates consumers' beliefs about the tastiness and healthiness of 173 food items in a framed field experiment designed to mirror a grocery shopping environment. Using data collected from 129 food shoppers in Grenoble, France, demand models are estimated to determine how product choice is affected by price, taste, and perceived healthiness, and how choices change with the provision of objective health information. Unlike previous studies focusing on relatively complex nutrition labels, we elicit and convey health information using simple nutritional indices meant to lower search and cognitive processing costs. The results indicate that consumers are willing to pay for tastier foods and for healthier foods, particularly if the consumers have objective information (as opposed to perceived, subjective information) on nutrient content. The estimates suggest that the value of the type of nutritional information provided in the experiment is €0.98 per day. The figure refers to the daily welfare benefits that arise from being able to make a set of choices that better reflect people's preferences by receiving the nutrient index information on all 173 food items versus not having such information.

1. Introduction

In the United States, nutrition labels on packaged foods have been mandatory for over 20 years. European countries have been slower to adopt mandatory labels, but various standards and voluntary programs exist. The laws in each country normally require some form of standardized nutrition labels. These labels provide a wealth of information about calories along with macro- and micronutrient content. In accordance with the prevalence of nutrient labeling use, there have been several studies on the effectiveness and value of nutrition labels (Drichoutis et al., 2006, 2011; Grunert and Wills, 2007). However, results of these studies differ by the types of food and nutrient information, and they often rely on self-reported label use. These studies have suggested, for example, that the provision of information has a positive effect on the consumption of healthy ingredients such as fiber and a negative effect on the consumption of less healthy ingredients like fat and cholesterol (Drichoutis et al., 2006). However, it might be possible that simplified label formats are even more effective, and in fact prior research has suggested that consumers prefer simplified front of pack information rather than complex nutrition labels (Grunert and Wills, 2007). This paper was designed to determine the effect of simple nutrient information on consumer choice in an experimental context involving real food and real money in a manner that allows us to estimate the economic value of nutritional information aggregated over an entire day's meal choices.

Typical label designs tend to rest on the assumption that more information is better and that consumers will rationally update their subjective beliefs in response to objective information provided. However, research in behavioral economics suggests that the way information is framed, subtle cues, prior beliefs, and the amount of information released can have substantive effects on consumer behavior (Kahneman and Tversky, 2000; Rabin and Schrag, 1999; Wansink, 2004). In the context of food labels, this has led to public and private efforts to more succinctly convey nutritional information via traffic lights system (TLS) or front-of-package (FOP) labeling. Balcombe et al. (2010) found a strong preference on the part of consumers in the UK to reduce the quantity of any nutrient associated with a red light, indicating a food

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that is high in fat, sugar, or salt. Ellison et al. (2014) showed that numeric labels did not influence food choice in a restaurant, but TLS caused restaurant patrons to select lower-calorie menu items. Also, Roberto et al. (2012) mentioned that listing calories per serving information on FOP labels can increase knowledge and influence purchasing behavior. In fact, the US Food and Drug Administration (FDA) recently redesigned mandatory nutrition labels to more prominently emphasize overall calorie content and added sugars (Food and Drug Administration, 2014).

These previous papers suggest simple nutrient labeling is likely preferable to complex information. These findings prompted us to explore a simple form of nutrient information conveyed by two nutritional indices. One index provides information on the content of beneficial nutrients and the other provides information on less healthy nutrients; these simplified indices represent a succinct way to convey complex nutrient information (which previous research suggests reduces effectiveness) in a manner that is perhaps more transparent than TLS. Moreover, the index approach can be broadly and consistently applied across a wide array of foodstuffs.

Many of the previous studies on the effects of nutritional labeling tend to use consumers' self-reports of label use in surveys (Kreuter et al., 1997; Garretson and Burton, 2000; Derby and Levy, 2001). Unfortunately, such self-reports can be unreliable and may be endogenously determined with other factors, such as health consciousness and nutritional knowledge. To address some of these concerns, some research has studied consumers' actual purchases in a retail setting before and after the provision of nutritional information (Teisl et al., 2001). Such studies are typically limited to a handful of product categories, and as such, do not provide a comprehensive measure of the value of information to a shopper. Moreover, such studies often lack data on consumers' prior nutritional beliefs and may attribute changes in choice solely to nutrition, when in fact nutritional labels and claims may change taste perceptions (Kiesel and Villas-Boas, 2013).

Rather than relying on self-reports of label use, as has often been the case with prior research (Drichoutis et al., 2005; Derby and Levy, 2001; Feunekes et al., 2008; Garcia et al., 2007), we conduct a framed field experiment in which consumers make non-hypothetical food choices before and after the provision of information. Unlike prior research based on actual consumer purchases (e.g., Weaver and Finke, 2003), our experimental setting enables us to measure consumers' prior beliefs about the tastiness and nutritional content of foods. This allows us to better understand how consumers update their perceptions of the healthiness of food and how they sometimes tradeoff health for taste (Drichoutis et al., 2006; J.P. Smith, 2004; T.G. Smith, 2004). Akin to Teisl et al. (2001), we provide an explicit estimate of the economic value of the nutritional information conveyed in the indices, but unlike their analysis, our experimental approach allows us to estimate this value over a very wide range of food products, which allows us to arrive at an aggregate value of information irrespective of the particular types of foods chosen by a particular consumer.

The experiment was not conducted in a grocery store; however, by moving to a more controlled (though still non-hypothetical-real food-real money) environment, we are able to more conclusively identify the effects of interest. That is, our field experiment attempts to mimic a real market situation and has many advantages. First, we observe respondents' choice behaviors directly in treatment and control situations where we can be sure confounding factors did not enter. Second, although 173 food items used in our experiment represent a small portion of the options in the real world sold by grocery stores, the number of food options reasonably reflect the categories of choices available to respondents in the grocery store without providing overwhelming differentiation (e.g., apple cinnamon cheerios, honey nut cheerios medley crunch, chocolate cheerios, and multi grain peanut butter cheerios). This allows us to focus on cross-category substitution rather than within-category substitution. The 173 food items were chosen on the basis of average consumption by French people and in consultation with prominent nutritionists. Lastly, the repeated food choices under different labels and prices are not unlike what occurs in actual market situations. People usually shop for food repeatedly, and are confronted with food price changes in the real world. Moreover, Chang et al. (2009) has found non-hypothetical laboratory experiments have high external validity, leading to accurate prediction of grocery store market shares. Nonetheless, we suggest the resulting value of information we obtain is likely to represent an upper-bound measure because our within-subject, controlled environment is likely to focus more attention on the labels than might be the case in a "noisier" field environment.

Our research additionally builds on previous studies in other important ways. Teisl et al. (2001) showed that although nutrient labeling affected purchase behavior (and thus has positive value), it did not necessarily increase consumption of healthy food. This is because provision of health information can also signal information about taste. If people tend to associate more tasty food with less healthy food, the provision of health information could have unintended effects (Tepper and Trail, 1998; Raghunathan et al., 2006; Mai and Hoffmann, 2015). In accordance with this previous research, by asking consumers to rate the taste of each of the 173 food items on a −5 to +5 scale, where −5 represents distasteful and +5 represents delicious, our study includes taste as a utility driver. This allows us to study the impact of health information to deal with psychological effects when people face the health-related information.

In the following section, we describe our experiment. The economic approach used to estimate demand is then described. Results are then discussed, and the last section concludes the discussion of this study.

2. Experiment

The data for this study comes from a framed field experiment conducted in Grenoble, France. One hundred and twenty-nine women between the ages of 18 and 76 participated in the study. We recruited only women because they are the primary food shoppers in most French households. Subjects were recruited by placing announcements around town; subjects were offered a 20€ show-up fee for participation. During the introductory phase, the experimenter made sure the participants understood this amount of money (20€) was unrelated with the following tasks of the experimental session.

The experiment requested the participants to choose all the foods and drinks they desire to purchase for breakfast, lunch, and dinner for a given day using a hand-held scanner and a computer interface. The choices were repeated under three treatments or "days" (Fig. 1 summarizes the steps in the experiment).[1] We utilize a within-subject design so that each subject makes a day's worth of food choices in three different treatments. In each treatment, subjects were given a catalog from which they could select from among 173 different food items, each shown with a photo and corresponding price, using a handheld scanner. For anonymity, an identification number was the only way the participants could be identified in the experiment.

During the food choice task, participants were not restrained in their spending. Neither upper limits nor lower limits were set. This is important for three main reasons. First, we did not want to omit

[1] We did not randomize the order. However, no information whatsoever has been given during this task. Therefore, participants could not learn from their previous decisions. The only learning process possible is some kind of learning-by-doing, but it is difficult to imagine how such repetition could improve knowledge without any feedback between decisions.