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Does shelf-labeling of organic foods increase sales? Results from a natural experiment

Sven-Olov Daunfeldt [a,b], Niklas Rudholm [a,b,*]

[a] HUI Research, Regeringsgatan 60, SE -103 29 Stockholm, Sweden
[b] School of Technology and Business Studies, Dalarna University, SE-781 88 Borlänge, Sweden

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ABSTRACT

Can a simple point-of-purchase (POP) shelf-label increase sales of organic foods? We use a random-effects', random-coefficients' model, including a time adjustment variable, to test data from a natural experiment in a hypermarket in Gävle, Sweden. Our model incorporates both product specific heterogeneity in the effects of labeling and consumer adjustment to the labels over time. We find that the introduction of POP displays leads to an increase in sales of organic coffee and olive oil, but a reduction in sales of organic flour. All targeted products became less price-sensitive. The results reveal that product specific differences have to be accounted for, and in some cases consumers adjusted to labeling over time.

1. Introduction

The global organic food market has increased dramatically in recent years. Total organic food sales amounted to $15.2 billion in 1999, and rose to $62.9 billion in 2011 (Willer et al., 2013). Whole Foods, a chain that only carries organic food, has been highly successful and the decision of the world's largest retailer, Wal-Mart, to introduce organic food in their super-centers has further increased organic food supply.

Many studies investigate what determines consumers' attitudes towards and preferences for organic food. Perceived health benefits and considerations about taste and food quality seem to be the main drivers of organic food demand (Magnusson et al., 2001; Chinnici et al., 2002; Wier and Calverly, 2002; Vermeir and Verbeke, 2006; Monier et al., 2009). Private benefits thus seem more important in explaining consumption of organic foods than public benefits such as improved biodiversity and reduction of pollution (Caswell and Mojduska, 1996; Conner, 2004; Molyneaux, 2007).[1] However, there are substantial barriers to growth of sales of organic foods (Jolly, 1991; Tregear et al., 1994; Hack, 1995; Chinnici et al., 2002; Vermeir and Verbeke, 2006), including, for example, a large price-difference between organic and non-organic foods, inadequate supply of organic products, and multiple overlapping organic standards and certificates.

As noted by Bauer et al. (2013), retailers can use organic labels as a brand differentiation strategy to increase consumers' willingness to pay. They find support for their hypothesis using an online experiment, but it is far from certain that this result holds in a real store environment where consumers are confronted with many different types of impressions. Point-of-purchase (POP) displays might in this case be an efficient tool for making the whole assortment of organic products more visible to consumers, and thereby influence consumers' buying intentions. However, few studies have explicitly addressed the effects of POP displays on the demand for organic food. An exception is Reicks et al. (1999), who found that they increased sales of organic food in a discount/warehouse store in the Twin Cities metropolitan area of Minnesota, but produced mixed results in a more up-scale shopping environment. One drawback is that they used both printed signs and take-home brochures in their experiment, making it impossible to distinguish between the effects of these interventions.

Using data from a natural experiment in a Swedish hypermarket, we test whether a simple low-cost POP shelf-labeling could increase sales of organic foods. Three product categories are studied: coffee, olive oil, and flour. Introduction of POP displays might be effective since, according to the Point of Purchase

* Corresponding author at: HUI Research, Regeringsgaton 60, SE -103 29 Stockholm, Sweden. Tel.: +46 8 762 72 80; fax: +46 8 679 76 06.
E-mail addresses: nru@du.se, niklas.rudholm@hui.se (N. Rudholm).

[1] However, Hack (1995) and Bellows et al. (2008) argue that environmental concerns are a main incentive for purchases of organic food.

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Advertising Institute (POPAI, 1997), 74% of all purchase decisions are made in the store. Previous studies have shown that, in most cases, POP displays increase sales (Grover and Srinivasan, 1992; McKinnon et al., 1981), but the results seem to differ across product categories (Curhan, 1974; Wilkinson et al., 1982a, 1982b). In some cases, POP displays even reduce sales of the targeted brands (Kumar and Leone, 1988; Areni et al., 1999).

None of the studies mentioned above take into account that the introduction of POP displays can affect individual products within a specific category differently. For example, the impact of the shelf-label can differ depending on where on the shelf the targeted products are placed. We incorporated this possibility into the statistical analysis by using a random-effect, random-coefficient model.

Previous studies have also (implicitly) assumed that consumers adjust instantaneously to the introduction of POP displays. We relax that assumption by introducing an adjustment term into the empirical model, which shows whether consumer demand adjusted instantaneously or over time. If there was an adjustment period, our model measures the speed and duration of adjustment. Finally, we also investigate whether the introduction of POP displays makes the consumers less sensitive to price changes.

The field experiment here is not designed by the researchers, but rather introduced exogenously by the store owners. Shelf-labeling for organic foods is introduced simultaneously for all product categories in the store, and consumers had no prior information about the experiment.

The experiment and some descriptive statistics are presented in the next section. Section 3 then describes the empirical method, and Section 4 presents the results. The last section summarizes and draws conclusions.

2. The experiment and the data

The effect of POP displays on the demand for organic food is examined using daily sales-data from a ICA hypermarket located in the typical medium-sized Swedish municipality of Gävle (93,000 habitants), 180 km north of Stockholm. ICA is the biggest chain-store operator in the Swedish retail-food market. Shelf-labels were introduced for all organic commodities in the hypermarket on March 10, 2008. The label was a green circle with white letters, pointing out from the shelves, making the organic choices in each product category more visible for consumers. The store owners did not re-locate the products due to the introduction of these POP-displays, and no other announcements were put in place to attract consumers to buy organic products. The effect of this new POP display was tracked for 521 days, from April 18, 2007 through September 22, 2008.

Data are collected from three product categories: olive oil, flour, and coffee. These categories are selected because the individual products in each are relatively homogenous during the period under study, reducing the risk that the results are affected by some other exogenous factor correlated with the introduction of the shelf-labels. The data include information on the unique EAN-code for product i, the quantity of product i sold (*SALES*), and the price (*PRICE*) of product i, as well as the year, month, and weekday when the data were collected.

From June 2007 until June 2008 unemployment rose marginally in Sweden (from 7.8 to 8.1 percent), while labour income increased nominally by 3%. However, the Swedish consumer price index increased by approximately 4% during the same period, indicating a 1% decrease in real income. As for exchange rates, 1 US dollar equaled 7.09 Swedish crowns (SEK) on June 15, 2007 and 6.09 SEK 1 year later. We can thus observe a 14% depreciation of the Swedish currency during this period, which increased prices of imported products such as coffee, flour and olive oil; although the main price increases in our dataset was for coffee and flour (see Table 2). In order to control for these types of changes in the overall macroeconomic situation in Sweden, we will also include a trend variable in estimated models that takes the value one for day 1, two for day 2, and so on.

We adopt an intervention-control approach to estimate the impact on sales of the new shelf-displays on organic foods. The intervention or test group consists of all organic foods for which shelf-labels are introduced, after the introduction. The control group consists of those same organic foods before the shelf-labels are introduced, as well as other non-organic foods both before and after the introduction. Thus, this intervention-control approach means that we are measuring the effect on sales of being in the intervention group (i.e. being a product that got a shelf label) after the introduction of the shelf labels compared to the sales of the same products before the introduction of the labels and a pure control group consisting of non-organic products.

This experimental setup and data collection means that there are two different ways that the introduction of the shelf labels could affect total sales. First, it can increase total sales due to new customers being attracted by the labels. Second, consumers that previously bought non-organic products could shift demand from non-organic to organic products due to the labeling. The setup of the experiment and the empirical method used below means that we are measuring the total effect through both alternatives on the demand of the labeled products. However, in order to give some indication if the second effect is large, we also do some time series analysis of total sales in the product categories.

Tables 1 and 2 present monthly averages of the number of sold units per product per day and the price per product per day for sold units of both non-organic and organic products for our three product categories. For non-organic products, sales are fairly constant in all product categories over time with some monthly variation: for organic olive oil there is somewhat of a positive trend in sales, while for organic flour there is somewhat of a negative trend in sales. Finally, for organic coffee the average number of units sold before and after the introduction of the shelf labels is fairly constant, but with quite large between month variation in sales. However, none of these trends in sales are statistically significant when comparing the period before and after the introduction of the shelf labels (see Table 3) and should be interpreted with caution.

Table 1
Average number of units sold per product per day.

Year, Month	Olive oil		Flour		Coffee	
	Non-org.	Org.	Non-org.	Org.	Non-org.	Org.
2007, April	2.86	1.40	7.67	3.96	36.83	19.03
May	3.38	1.81	7.96	2.43	18.47	9.05
June	4.14	2.15	7.94	2.96	29.80	19.25
July	3.64	1.96	8.34	2.70	27.01	19.71
August	3.57	3.67	8.25	2.83	32.04	27.51
September	3.02	1.91	8.03	2.21	20.71	11.01
October	2.63	1.83	8.06	2.57	19.49	12.06
November	2.85	4.10	9.90	3.36	21.89	13.81
December	2.55	2.43	11.19	3.41	31.02	26.10
2008, January	2.65	2.65	7.31	2.89	22.66	17.70
February	2.72	2.17	7.83	2.35	25.07	16.79
March	2.69	3.38	7.88	2.28	19.69	12.95
April	3.15	3.40	7.30	2.25	18.66	10.90
May	3.16	3.71	7.58	2.04	21.43	12.62
June	3.26	3.50	7.71	1.66	21.86	7.12
July	2.71	2.69	7.27	1.48	16.94	11.09
August	2.71	2.69	8.66	1.73	26.23	8.59
September	2.27	2.54	8.93	1.92	18.71	7.31