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ASSESSING SUGAR REDUCTION SCENARIOS FOR BREAKFAST CEREALS IN GERMANY BASED ON BRAND- LEVEL DEMAND ESTIMATES

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Summary

We analyze effects of sugar reduction on market shares in the category of breakfast cereals marketed to children based on German household scanner data. Using estimated parameters from a mixed logit model, we simulate different reformulation scenarios. Our results indicate that simultaneous sugar reduction by all national brands and private labels will leave market shares mostly unaffected. Unilateral reductions by single firms will lead to decreases in the reducing firm's market share of up to 4.3 %-points. These findings support a concerted industry-wide effort as currently undertaken within the national reduction initiative.

Keywords

Sugar reduction, simulation, mixed logit model, household scanner data, breakfast cereals

1 Problem Statement and Objectives

Reformulation of processed foods is increasingly regarded as an effective strategy to reduce the intake of sugar, salt, or fat, and to alleviate associated public health problems such as obesity and diabetes. In Germany, the Federal Ministry of Food and Agriculture (BMEL) has launched the National Reduction and Innovation Strategy, in which manufacturers and retailers have set voluntary goals to reduce the contents of these nutrients in a broad range of categories (BMEL 2018). A particular focus is on breakfast cereals marketed to children, with the objective to reduce the sales-weighted mean of sugar content by at least 20 % until 2025 (VMSG 2018). Industry associations and economic literature have pointed out, that such strong reductions in sugar may lead consumers to shift away from reduced products no longer matching their taste expectations, posing a substantial risk to sales and profits of manufacturers. The danger of economic losses for single firms has been argued to be larger when they attempt to reformulate unilaterally (RÉQUILLART and SOLER 2014).

However, empirical evidence on the impact of sugar reduction on consumer choice and substitution behavior based on actual market data is lacking. The objective of this paper is to derive estimates of product choice for breakfast cereals marketed to children and to assess how different scenarios of sugar reformulation affect market shares.

2 Data and Methods

Our empirical analysis is based on household scanner data from the Gesellschaft für Konsumforschung (GfK) from 2016-2017. The data contain quantity and expenditure information of individual purchases at the barcode level, product and store characteristics, as well as annually collected sociodemographic characteristics and attitudes of panel households.

To model discrete product choice, we chose retail chains with sufficient numbers of purchases in the category and sets of products that are frequently available within each chain. These build the choice sets consumers face on a particular purchase occasion. We enhance the data by manually collected information on nutrition values of single products and impute prices based on observable strategies regarding discounts, retail chain, geographic area, and week. For the present analysis, we select a subsample and consider the case of Kaufland, whose hypermarkets have the largest range of products and feature the highest number of purchases for children cereals. Our sample includes 43 products from 9 different brands and consists of 3,452 purchase occasions from 827 households, yielding a total number of observations of 122,764.

We consider consumers' decision to purchase one of J_t products available in week t . The indirect utility, u_{ijt} , that household i receives from product $j = 1, \dots, J_t$ in week t is

$$u_{ijt} = \alpha_i p_{jt} + \beta_{1i} \text{sugar}_{jt} + \beta_{2i} \text{packsize}_j + \gamma_1 l_{brand_j} + \gamma_2 l_{size_j} + \gamma_3 l_{style_j} + \theta_{s,j} + \theta_{b,j} + \varepsilon_{ijt}. \quad (1)$$

Indirect utility is a function of p_{jt} , a product's price in €/100 g, sugar_{jt} , sugar content in g/100 g, packsize_j , package size in g, product-style fixed effects, $\theta_{s,j}$, (i.e. honey-popped, frosted-flakes, nougat-pillows), and brand effects, $\theta_{b,j}$. We include a set of loyalty variables in the style of GUADAGNI and LITTLE (1983), l_{brand_j} , l_{size_j} , l_{style_j} , indicating whether an alternative has the same brand, package size, or product style, respectively, as the product chosen on the previous purchase occasion. The error term, ε_{ijt} , is clustered at the household level as we have repeated purchases in our data. We estimate a mixed logit model (HOLE 2007), assuming random coefficients for price, sugar content, and package size.

We use the model parameters to predict market shares for one scenario in which all firms reduce the sugar content in their products by 20 %, and three further cases, where each of the major players (national brands Nestlé and Kellogg's, as well as private label K-Classic) reformulate.

3 Results and Discussion

Model results show a positive and highly significant effect of a product's sugar content on utility. A significant standard deviation of the sugar coefficient indicates heterogeneous preferences. The estimated model yields highly accurate within-sample predictions, which is particularly carried by the included loyalty variables.

Compared to predicted shares at original sugar levels, a 20 % reduction in sugar content by all firms has almost no effect on market shares. If only Kellogg's was to reduce sugar in its products, its share would decrease by 4.3 %-points, with K-Classic being the largest beneficiary (+3.6) before Nestlé (+0.6). A unilateral reduction by Nestlé would yield a smaller decrease in share by 1.0 %-points, and lower gains for K-Classic (+0.8) and Kellogg's (+0.2). Sugar reduction only for K-Classic would lead to a loss of 3.7 %-points in market share, and increases by 2.2 points for Nestlé and by 1.0 points for Kellogg's.

Our findings suggest that a concerted, simultaneous reduction effort by all firms is unlikely to trigger major substitution behavior between different brands. In contrast, unilateral reformulation lead to low but significant losses in market share. Our results therefore support policy initiatives such as the national reduction and innovation strategy, in which manufacturers agree to common goals and where progress in reduction is monitored regularly.

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