The Effects of Media Coverage of the 2009 Cookie Dough Recall on the Demand for the Brand and the Close Substitutes

Abhishek Bharad
Department of Agricultural Economics and Agribusiness
Louisiana State University
Email: abhara2@tigers.lsu.edu

R. Wes Harrison
Department of Agricultural Economics and Agribusiness
Louisiana State University

Christopher Davis
Economic Research Service, USDA


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Abhishek Bharad*, R. Wes Harrison*, Christopher Davis*
*Department of Agricultural Economics and Agribusiness, Louisiana State University
*Economic Research Service, USDA

Abstract
Not only does information about food recalls play a vital role in changing the demand for implicated food products, but it also impacts the demand for close substitutes. The study aims to identify the structural change in demand for cookie dough due to the 2009 cookie dough recall of Brand1, one of the most publicized single brand recalls in recent years. The study utilizes Barten’s synthetic demand system, and introduces a sentiment analysis technique to identify the tone of media publicity and its effect on demand. The results suggest a spillover effect in the cookie dough market and finds that media sentiment has an effect on consumption.

Objective
• To estimate the change in consumer demand relationships for the refrigerated cookie dough market after a food safety outbreak was announced.
• To identify the tone of the information and estimate the spillover effect of media sentiment on the refrigerated cookie dough brand in general.

Method
• The study adopts a demand system approach, a differential demand system called Barten’s Synthetic Model (BSM). BSM nests four demand systems viz. Rotterdam, CBS, NBR, and AIDS.
• The structural change of demand for cookie dough was determined by comparing price elasticities from the pre-recall (77 weeks) and post-recall (72 weeks) period.
• The models with different autoregressive orders and lags of sentiment index were tested. A Likelihood Ratio hypothesis test was conducted to identify the appropriate lag length for the model.
• The final model chosen for the study was AR(2) model with the first lag of the sentiment index.

Model
Barten’s Synthetic Model:
\[
wdg g = \sum_{i=1}^{n} \left[ \beta_i \ln(p_i) + \sum_{j=1}^{n} \gamma_{ij} \ln(p_{ij}) \right] + \epsilon_i, \quad i = 1, \ldots, n
\]
Divisia Volume Index:
\[
dlg g = \sum_{i=1}^{n} w_i dw g_i
\]
Adding up:
\[
\sum_{i=1}^{n} \beta_i = 1 - \lambda_i \quad \text{and} \quad \sum_{j=1}^{n} \gamma_{ij} = 0, \quad j = 1, \ldots, n
\]
Homogeneity:
\[
\sum_{j=1}^{n} \gamma_{ij} = 0, \quad j = 1, \ldots, n
\]
Symmetry:
\[
Y_{ij} = Y_{ji}, \quad i, j = 1, \ldots, n, \quad i \neq j
\]

Results
• The results show all the compensated own-price elasticities were negative in accordance with the law of demand. The results also show a significant structural change from a pre-recall to a post-recall period.
• The results for the compensated cross-price elasticities indicated a strong substitution effect between Brand1 and Brand2 in the pre-recall period, with magnitudes decreasing from pre-recall to post-recall period.
• The sentiment elasticity for Brand2 was significant in both time periods. In the pre-recall period, the sentiment elasticity was negative, which meant an increase in bad sentiment in media coverage decreased consumption of Brand2.
• The sentiment elasticity for Brand2 in the post-recall period was positive, suggesting that the increase in bad sentiment towards Brand1 cookie dough during the recall, increased the consumption for Brand2 cookie dough in the post-recall period.
• The results from tests identifying change in elasticities from pre-recall to post-recall period confirm the changes in compensated own-price elasticities were significant.

Conclusion
• By using BSM, the study finds the 2009 cookie dough recall of Brand1 had an effect on the demand of refrigerated cookie dough brands.
• We found a strong substitution effect between Brand1 and Brand2, suggesting a significant spillover effect in this market.
• Even though the study did not find a direct effect of media sentiment on Brand1 itself, media sentiment did boost the consumption of its substitutes, Brand2.

References

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