The Impact of NuVal Shelf Nutrition Labels on Food Choices: Evidence from Frozen Dinner Purchases

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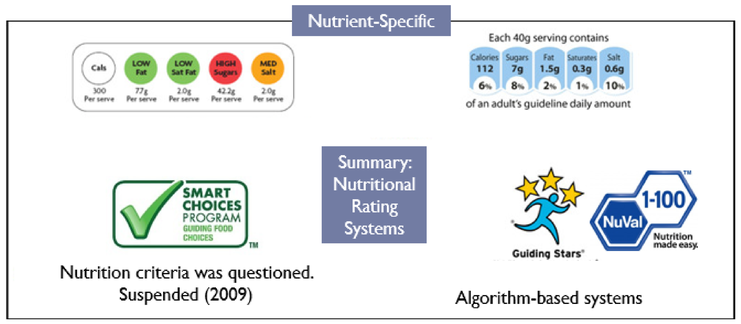
Abstract

Research examining the effect of shelf labels that present a parsimonious summary of the nutrition profile of food products on consumers' behavior in real market settings is scarce. Using purchasing data when a supermarket voluntarily adopt NuVal—a 1 to 100 numeric summary shelf label system, we estimate a Two-Part Model (TPM) to identify the effect of the NuVal label on consumer purchasing decisions for frozen dinner products. Our results show that posting NuVal scores increases the purchase volume of healthier frozen dinner product. Further, results indicate that NuVal scores impact the likelihood to purchase frozen dinner products with higher nutrition scores among key demographic groups including low-income households and households with children. In addition, censored quantile regressions reveal that the impact of NuVal labels is heterogeneous between light-user and heavy-user households.

Shelf Nutrition Labeling on Processed Foods

- Proliferation of different FOP labels might confuse consumers (Draper et al., 2013)
- Institute of Medicine's (IOMs) Committee recommended the development of a standardized nutritional symbol that provides a ranking of the nutritional quality of the labeled products (Nathan et al., 2011).
- **Shelf Nutrition Labeling** simplifies nutritional information delivered by Nutritional Facts Label (NFL).



Source: RTI, 2011 (Adapted)

Time Constraints-Frozen Food-Reading NFL

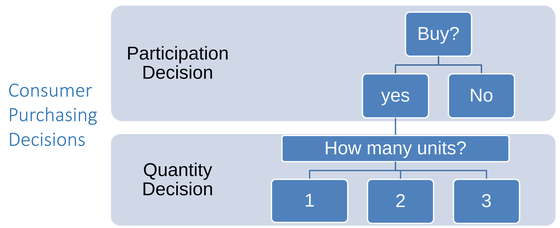
- Time-constrained households tend to overlook existing nutritional labels (Grunert and Wills, 2007)
- Time constraints may prevent WIC and SNAP participants from reaching healthy nutritional goals (Davis and You, 2011, Rose, 2007, Treiman et al., 1996).

Overall Nutritional Quality Index (ONQI®)

Source: NuVal.com

Objective

This study estimates the effect of NuVal Labels on Consumer's Purchasing Decisions and tests for Heterogenous NuVal Effects across Households.



Probability of a household buying a labeled product increases?

Switched to higher-scoring products?

Empirical Analysis

TPM

First Part

Binary Dependent Variable: d_{hitr}=1 if household made a purchase, 0 otherwise

$$d_{hirt} = a_i + a_i * t + a_t + a_r + a_h + b_1 P_{itr} + b_2 Adopt_{itr} + b_3 Adopt_{itr} * Score_i + M'_{itr}\gamma + \epsilon_{hitr}$$

Conditional Part

Continuous Dependent Variable : V_{hitr}>0, volume purchased

$$V_{hirt} = a_i + a_i * t + a_t + a_r + a_h + b_1 P_{itr} + b_2 Adopt_{itr} + b_3 Adopt_{itr} * Score_i + M'_{itr}\gamma + \epsilon_{hitr}$$

where:

P_{itr}: price per gram

$Adopt_{itr}$:=1 if retailer r had posted NuVal score

$Score_i$: NuVal score of UPC i

D_h: Households characteristics

M_{itr}: display, feature, and price discounts

$a_i, a_t,$ and a_r: product, time, and retailer fixed effects; ϵ_{hitr}: the error term

$\boldsymbol{Adopt_{itr} * Score}$: Effect of providing nutritional information via NuVal Scores

Conditional Quantile Regression

Estimates the τ conditional quantile function:

$Q_Y(\tau|x) = x'\beta(\tau),\ 0 < \tau < 1$

where: τ quantile level

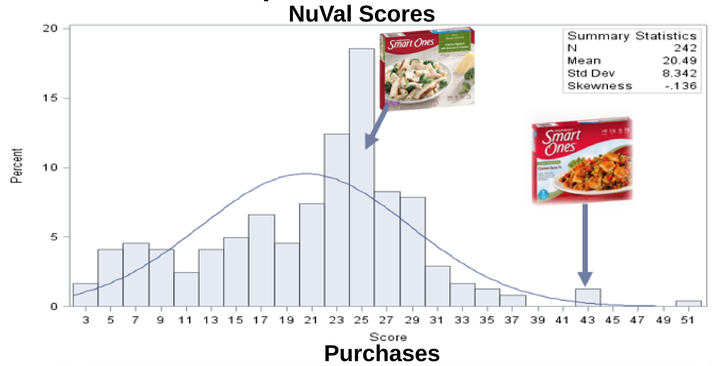
$Q_Y(\tau|x)$ τth percentile. $Q_Y(\tau|x) = F^{-1}(\tau) = \inf\{y: F(y|x) \geq \tau\}$

$\beta(\tau)$ coefficient can be estimated by minimizing the function over β:

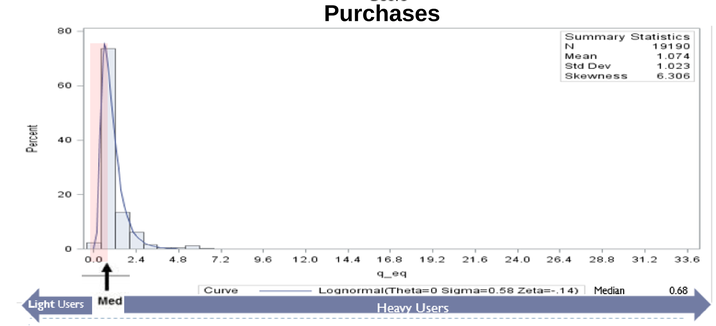
$r(\beta)=\sum_{i=1}^{n} \rho_\tau(Y - x'\beta(\tau)),\quad z = Y - x'\beta(\tau)$

Sample Characteristics

NuVal Scores



Purchases



Product and Household Characteristics

	Variables	Description	Mean
Marketing	P	Price per equivalized unit	4.218
	Ad	Ad =1 if coupon or if any advertising sign, 0 otherwise	0.070
	PR	Price reduction flag= 1 if Total Price Reduction is 5% or greater, 0 otherwise	0.243
Socioeconomic Status	Low Inc	Low Inc=1 if low-income household according to the FPG, 0 otherwise	0.281
	No College	No College=1 if household heads have not attended college, 0 otherwise	0.575
Household Composition	Single	Single=1 if household head is single, 0 otherwise	0.660
	Married	Married=1 if household head is married with no children, 0 otherwise	0.115
	Children	Children=1 if household has children, 0 otherwise	0.201
	Full Time	Full Time=1 if household heads have full-time	0.221
Employment Status	Not Employed	Not Employed=1 if household head is not working	0.102
	Retired	Retired=1 if household head is retired	0.084

Results

TPM

Conditional NuVal Effects on Purchases across Demographic Groups

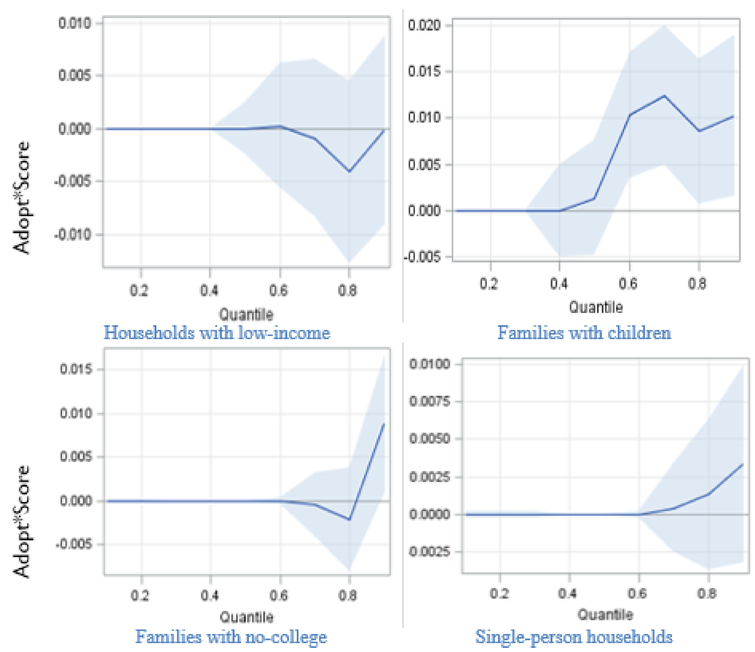
Category	Group	NuVal Effects (Units)			NuVal Effects (% Change)		
		Min Score	Mean Score	Max Score	Min Score	Mean Score	Max Score
SES	Low Income	-0.536	-0.221	2.083	-33.81%	-13.92%	31.46%
	No College	-0.081	0.100	1.716	-6.37%	7.94%	35.73%
Composition	Children	-0.395	0.026	2.954	-19.68%	1.32%	47.29%
	Single	-0.069	0.100	1.966	-4.47%	6.43%	26.66%

Unconditional NuVal Effects on Purchases across Demographic Groups

Category	Group	NuVal Effects (Units)			NuVal Effects (% Change)		
		Min Score	Mean Score	Max Score	Min Score	Mean Score	Max Score
SES	Low Income	-0.021	-0.027	-0.041	-14.34%	-18.97%	-28.06%
Composition	Children	-0.082	-0.004	0.281	-43.00%	-2.02%	147.99%

Decrease in sales of healthy products (e.g., low-fat), because consumer associate these products with a poor taste (Berning et al., 2010, Kiesel and Villas-Boas, 2013)

Conditional Quantile Regression



Higher Impact at Upper Quantiles only for households:

- With Children (47%) : 0.6 Q: 31%, 0.7 Q: 41%, 0.8 Q: 28%, 0.9 Q: 30%
- No-college education (36%): 0.9 Q: 35%

Conclusions and Implications

- Posting NuVal scores on shelf tags of frozen dinner increases the purchase volume of healthier frozen dinner and influences the likelihood of buying healthier frozen dinner among households with low-income and shoppers who have with at least one child.
- High-volume shoppers experienced greater improvements compared with light-volume users among households without college education and households with children.

Acknowledgment

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