Do Firms "Misrepresent" Nutrients Based on Label Rounding Rules?

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Do Firms "Misrepresent" Nutrients Based on Label Rounding Rules?

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Motivation

Diet is linked to many common health concerns in the United States.
- Obesity
- Heart Disease
- Type 2 Diabetes

The Nutrition Labeling and Education Act requires nutrition facts panel (NFP) labels on most food products. The purpose of the NFP is to:
- reduce consumer confusion about food labels
- help consumers make healthy food choices
- provide incentives for firms to increase the nutritional quality of food (Wilkening 1992)

Nutrition Facts

Serving Size 1 cup (28g)
Children Under 4 - ¾ cup (21g)
Servings Per Container about 18
Children under 4 - about 24

Amount Per Serving	Cheerios	with ½ cup skim milk	Cereal for Children Under 4
Calories	100	140	80
Calories from Fat	15	20	10
		% Daily Value**	
Total Fat 2g*	**3**%	**3**%	1.5g
Saturated Fat 0g	**0**%	**3**%	0g
Trans Fat 0g			0g
Polyunsaturated Fat 0.5g			0g
Monounsaturated Fat 0.5g			0g
Cholesterol 0mg	**0**%	**1**%	0mg
Sodium 160mg	**7**%	**9**%	120mg
Potassium 170mg	**5**%	**11**%	130mg
Total Carbohydrate 20g	**7**%	**9**%	15g
Dietary Fiber 3g	**11**%	**11**%	2g
Soluble Fiber 1g			0g
Sugars 1g			1g
Other Carbohydrate 17g			12g
Protein 3g			2g

Prior literature supports the claim that consumers use NFPs when making purchase decisions (Variyam 2008, Mandal 2010, Cook, Burton & Howlett 2011).

If NFPs influence consumer decisions, numerical rounding nutrient content may impact the healthfulness of a consumer's diet without their knowledge.

The NFP rounding rules may increase the likelihood of diet-related health concerns for label reading consumers.

Incentive to Round

Consumers select a product to maximize utility by considering the attributes of the product and their budget constraint. Based on Gorman (1956) and Lancaster (1966) we consider nutrients as product attributes. Nutritional attributes are credence goods, which consumers cannot easily verify. Thus, consumers may use NFPs and health claims to determine perceived nutritional attributes. Consumer demand depends on the perceived nutritional attribute mostly based on producer provided information. Profit maximizing firms will formulate products to appeal to consumer preferences. The FDA allows firms to round the nutrient information on NFPs such that the perceived nutritional attribute may differ from the actual attribute. Thus, firms may have an incentive to formulate their products to be able to claim specific nutritional attributes not actually present in their product.

Rounding firms choose to round up or down, and also how much to round. We use a Probit model to analyze the likelihood of rounding and OLS to analyze the magnitude of rounding.

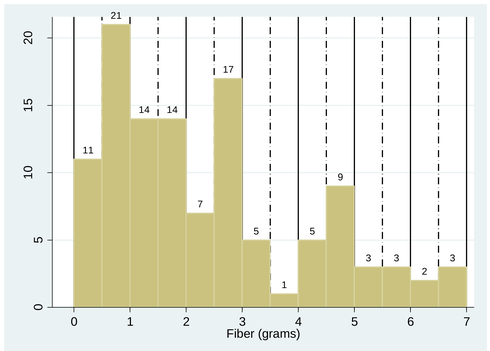
Research Question

How do firms formulate the nutrient content of ready-to-eat cereals to maximize profits when presenting nutrient contents on nutrition facts panels given the FDA nutrition facts panel rounding rules?

Data

- The data consists of 130 ready-to-eat cereal recipes available in the USDA National Nutrient Database for Standard Reference releases 25 and 26
- These exact nutrient values are matched to the rounded nutrient values collected from cereal boxes in-store and online
- We focus on Calories, Total Fat, Saturated Fat, Carbohydrates, Fiber, Sugar & Protein
- Health claims are collected from cereal boxes in-store or online
- Target markets and the product health rating system are found at cerealfacts.org

How do the actual cereal nutrients get labeled with the FDA rounding guidelines?



- Within each rounding window we see more products are formulated such that fiber is rounded up
- 3 peaks where rounding up occurs more than rounding down is where fiber will be presented as 1g rather than 0g, 3g rather than 2g, and 5g rather than 4g
- 3g and 5g correspond to label claims of a "good source of fiber" and a "great source of fiber"

References

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Results

What influences the likelihood of rounding?

	Round Down Calories	Round Up Fiber	Round Down Sugar
All Natural		1.2624**	-0.7653*
		(0.5922)	(0.4462)
Whole Grain			0.4302*
			(0.2539)
Round to Fat Free	0.9121**		
	(0.4567)		
Round to Low Fat			
Round to Good Fiber		0.7829**	
		(0.3650)	
Round to Excellent Fiber		0.9931**	0.8700*
		(0.4596)	(0.4565)
Adult Market			
Analyzed in a Lab		1.1352**	
		(0.4486)	
Constant	-0.6362**		
	(0.3106)		

Positive coefficients indicate increased likelihood of rounding. * significant at .10 level, ** .05 level, ***.01 level.

What impacts the magnitude of rounding? Do health ratings matter?

	Calories Rounded Up			Calories Rounded Down		
	High Rated	Medium Rated	Low Rated	High Rated	Medium Rated	Low Rated
All Natural		-2.1840*				
		(1.1267)	X			
Whole Grain		-2.2849**	-1.4909***			
		(0.8776)	(1.4423)			
Round to Fat Free	X			X		
Round to Low Fat		-3.0781**	2.4174***		-3.2715***	
		(1.3166)	(0.8094)		(0.8233)	X
Round to Good Fiber						X
Round to Excellent Fiber		X	X		2.0714**	
					(0.7939)	X
Adult Market	X			-3.0418**		
				(1.0532)		
Analyzed in a Lab	X				-2.3947*	
					(1.1455)	
Constant			-1.8780***	7.7394**	3.4416*	3.6400**
			(0.6412)	(2.5404)	(1.7069)	(1.2628)

Positive coefficients indicate rounding down. * significant at .10 level, ** .05 level, *** .01 level. X indicates variables not present.

Findings and Implications

- We often observe "healthy" nutrients rounded up and "unhealthy" nutrients rounded down
- Health claims, nutrient tradeoffs, and target markets influence the likelihood and magnitude of rounding
- Rounding differs based on the health rating of a cereal
- If consumers use labels to purchase specific nutrient attributes the rounding rules may have consequences and healthy ratings may be misleading