

# **Low Fat, Low Calorie, Low Attention**

## **Optimal labeling for “coarse thinking” consumers**

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# Focus on FDA regulated labels



# FDA regulation

Rich and evolving regulation (2012 natural experiment?)

## Code of Federal Regulations Title 21

The terms “calorie free,” “no calories,” [...] may be used on the label or in the labeling of foods, provided that: (i) The food contains less than 5 calories per reference amount customarily consumed and per labeled serving.

The terms “fat free,” [...] or, in the case of milk products, “skim” may be used on the label or in labeling of foods, provided that: (i) The food contains less than 0.5 gram (g) of fat per reference amount customarily consumed and per labeled serving [...] and (ii) The food contains no added ingredient that is a fat or is generally understood by consumers to contain fat [...] (iii) As required in 101.13(e)(2), if the food meets these conditions without the benefit of special processing, alteration, formulation, or reformulation to lower fat content, it is labeled to disclose that fat is not usually present in the food (e.g., “broccoli, a fat free food”).

The terms “low fat,” [...] may be used on the label [...] provided that: [...] reference amount customarily consumed greater than 30 g or greater than 2 tablespoons and contains 3 g or less of fat per reference amount customarily consumed.

For dietary supplements, claims for fat, saturated fat, and cholesterol may not be made on products that meet the criteria in 101.60(b)(1) or (b)(2) for “calorie free” or “low calorie” claims.

# Research questions

## ① How do labels affect consumer behavior?

- Fully attentive consumers should not be affected
- Same prediction for “fully inattentive” ones
- Partially attentive consumers can improve their choice

## ② How do changes in regulation affect producers/retailers?

- Assume no product adjustment. Can we observe price changes?  
Is it an optimal response to consumer additional information?
- Do producers adjust their quality according to new regulation?

## ③ How *should* FDA choose the requirements?

- Current criteria are mainly health/dietary based
- Agentic vs Paternalistic approach

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## Coarse thinking consumer model

Consumers differ in their preference over product quality  $q$   $U_\alpha(q)$ , and information cost  $\lambda \geq 0$ . In order to achieve the precision level  $\rho \geq 0$ , she needs to pay the cost  $\lambda \cdot \rho$ .

The consumer selects a pair  $(\rho, \Pi_\rho^i)$  of attention level and product partition cell. The outside option is represented by  $(\rho, \emptyset)$ .

Two-stages decision process: choose precision level  $\rho$  optimally, then select a random product from the best partition cell.

$$\max_{\rho \geq 0} U(\rho) = EU_\alpha^*(\rho) - \lambda \cdot \rho$$

$$EU_\alpha^*(\rho) = \operatorname{argmax}_{i \in [1, \dots, 2^\rho] \cup \emptyset} \mathbb{E} \left[ U_\alpha(q) - p(q) \mid q \in \Pi_\rho^i \right]$$

# Coarse thinking consumer model

## ① Buyer

- Assume fixed distribution of product quality
- Solve the problem before and after the introduction of the high-quality label (quality above a minimum threshold)
- The label represents free information
- In a continuous environment, utility strictly improves with probability one.

## ② Seller

- Assume fixed distribution of consumer preference
- Exploit consumers' surplus: erode part of the benefit
- Example: charge higher prices for labeled products (fixed fee).

## ③ Policy maker

- Anticipate buyer and seller response
- Choose the threshold optimally (based on which objective?).



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# Literature review

## ① Cognitive economics

- Rational inattention to discrete choices: Matejka and McKay (2015), Cheremukhin et al. (2015), Matejka (2016)
- Categorization: Gennaioli and Shleifer (2010), Manzini and Mariotti (2012), Robson and Whitehead (2017)

## ② Information design

- Mullainathan et al. (2008), Piccione and Spiegler (2012) [persuasion], Gabaix (2014) [sparsity-based decisions]

## ③ IO literature

- Nutrition labeling: Abaluck (2011)
- Reputation and regulation: Diamond (1989), Hui et al. (2017)
- Consumer inattention: Mehta et al. (2003), Pires (2015) [consideration set], Clerides and Courty (2015) [quantity surcharge], Moraga-Gonzales et al. (2017) [sequential search]

# Data

Nielsen Consumer Panel Data: longitudinal home scanner data and household information. 40,000 United States households, 2004-2016.

- Demographic and geographic variables (household)
- **Purchases:** date, the UPC code (for each product purchased), quantity, price.
- **Products:** All 10 Nielsen food and nonfood departments: dry grocery, frozen foods, dairy, deli, packaged meat, fresh produce, nonfood grocery, alcohol, general merchandise, and health and beauty aids.
- **Product characteristics:** UPC code and description, brand, multi-pack, and size, product group, and product module. Some products contain additional characteristics (e.g. flavor).

# Road map

## ① Changes in consumer behavior

- Reduced-form analysis: purchase pattern
- Detect discontinuity in purchase behavior

## ② Changes in seller behavior

- Reduced-form analysis: prices and characteristics
- Structural-form analysis: coarse thinking vs consideration set

## ③ Optimal labeling

- Counterfactual policy

## ④ April 25: IO Colloquium presentation