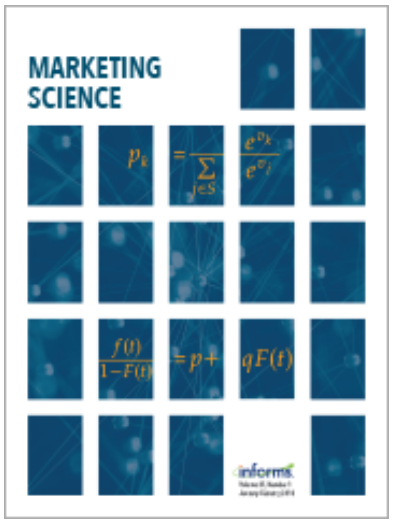

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Commentaries and Reply to "Unintended Nutrition Consequences: Firm Responses to the Nutrition Labeling and Education Act" by Christine Moorman, Rosellina Ferraro, and Joel Huber

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Commentaries and Reply to "Unintended Nutrition Consequences: Firm Responses to the Nutrition Labeling and Education Act" by Christine Moorman, Rosellina Ferraro, and Joel Huber

This series of discussions presents commentaries and a response on the impact the Nutrition Labeling and Education Act of 1990 has had on brand nutritional quality and taste as raised in Moorman et al. [Moorman C, Ferraro R, Huber J (2012) Unintended nutrition consequences: Firm responses to the Nutrition Labeling and Education Act. *Marketing Sci.* 31(5):717–737].

Key words: nutrition labels; nutrition; taste; firm strategy; public policy; quality information
History: Preyas Desai served as the editor-in-chief for this article.

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Further Examining the Impact of the NLEA on Nutrition

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As vice president of global design and development for PepsiCo, and a nutritionist who is passionate about improving consumer health, I was intrigued by many of the insights and recommendations in "Unintended Nutrition Consequences: Firm Responses to the Nutrition Labeling and Education Act," a study performed by Christine Moorman and her colleagues that analyzed firm responses to a 1990 federal law that required standardized nutrition labeling on most foods.

By introducing the Nutrition Labeling and Education Act (NLEA), the U.S. Food and Drug Administration (FDA) hoped consumers would better understand the nutritional value of products. It was thought that the new uniform labels would encourage healthier food choices among consumers, thus encouraging manufacturers to produce foods and beverages with higher nutritional quality to satisfy consumer demands.

Instead, Moorman et al. (2012) conclude that the NLEA has resulted in an overall reduction in nutritional quality and an increase in taste of foods produced between 1990 and 1996. The authors suggest this supports the idea that consumers value taste more than nutrition and perceive nutrition to be negatively correlated with taste.

The study's conclusions and recommendations are extremely relevant to policy makers, retailers, and professionals in the food industry such as myself. The article also provoked several questions worthy of further investigation by marketing researchers examining the impact of policy decisions on the marketing behavior of food and beverage companies.

One important question is whether the study's results would be the same if the data sets were expanded to include the years between 1996 and today. Behavior change on a mass scale is difficult and takes decades of effort, investment, and energy to effect. It may have been unrealistic to expect that the NLEA would have altered consumer preferences and behavior so drastically that, over the course of just six years, it would spur significant increases in the nutrition content of most products on the market. The NLEA was undeniably an important first step toward raising consumer awareness of the nutritional profiles of different foods and beverages. But it has taken time for consumers to become familiar with the Nutrition Facts Panel and hard work on the part of industry and policy makers to agree on how to best implement and communicate the new standards. If the authors were to expand their data sets beyond 1996, they might find that the NLEA has had a more positive impact on brand nutrition in recent years.

Another significant question relates to a recommendation made by Moorman et al. that food companies create package labels that feature nutrition information more prominently. This, they suggest, might encourage consumers to value nutritious foods and beverages more highly.

Many in the private and public sectors have already begun to explore new package labeling methods

extensively, as the authors themselves point out in their article. For example, the American Heart Association's Heart-Check mark began appearing on products that met its criteria for heart-healthy food in 1995; PepsiCo instituted its "Smart Spot" in 2005; and, in recent years, retailers have begun using systems such as NuVal® and Guiding Stars® to guide consumers to foods with high nutritional value through the use of numbers, stars, and color coding. Last year, many foods and beverages in the United States began featuring "Facts Up Front," a nutrient-based labeling system developed by the Grocery Manufacturers Association and the Food Marketing Institute. In addition, the Institute of Medicine recommended in 2011 that the FDA develop a new "interpretive" labeling system requiring products to display front-of-pack calorie counts by serving size as well as points; the number of points a product has—determined by the level of saturated fats, trans fats, sodium, and added sugars it contains—could be represented by check marks, stars, or other icons.

But which of these labels and systems are clearest to consumers? Which actually inspire them to value nutrition more highly? Which have the power to be the most effective, and why? These are questions that we in the food industry are hungry to understand and learn more about. It would be fascinating if marketing scientists were to further examine the impact of different food label systems so that their research could guide manufacturers, retailers, and government on ways to improve how we communicate nutrition information to consumers.

Finally, Moorman et al. (2012) correctly point out that there may have been share changes as a result of the NLEA that were not taken into consideration by their study. Their research narrowly focuses on how the NLEA impacted brand nutrition between 1990 and 1996. It is inferred that, because average brand nutrition appeared to decrease during this time, consumers did not value nutrition as much as they did taste. It is possible, however, that consumers shifted their purchases toward more nutritious products during that period. An analysis of the food and beverage market at a high level might reveal increases in the market share of products with higher nutritional value.

This is certainly an area worth further investigation. Did the NLEA impact consumer purchasing behavior in the years following its original introduction, and if so, how? Were there categories of products that were once considered "niche" but became more popular among mainstream consumers? Were there differences in how the NLEA impacted the purchasing behavior of consumers of different ages, ethnicities, income levels, or regions? The answers to questions such as these would certainly shed further light on the true impact of the NLEA on consumer perceptions of nutrition.

In conclusion, I appreciate many of the recommendations in Moorman et al. (2012) and am eager for marketing scientists to explore the impact of the NLEA further. It was certainly a positive starting point toward raising consumer awareness of the nutritional profile of different foods and beverages, but more must be done if we are to truly change behavior. The public and private sectors must continue to work together to better translate dietary guidance so that consumers can easily understand how to act on this information in their everyday lives. I am extremely grateful that we will have the help of marketing academics who can examine this important issue from a unique, new perspective, and I look forward to reading the results of future research on this topic.

References

Moorman C, Ferraro R, Huber J (2012) Unintended nutrition consequences: Firm responses to the Nutrition Labeling and Education Act. *Marketing Sci.* 31(5):717–737.

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Are Unintended Effects of Marketing Regulations Unexpected?

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Introduction

For better or worse, marketing matters. Medicine provides a classic example of the power of marketing. Imagine searching for a pain reliever. You spy an unlabeled bottle of white pills, sitting on a store shelf, among a jumble of other products. Would the bottle of pills have any value? Probably not. Add truthful ingredient information, and the pills become potentially useful to those who know how the ingredients work. Now, add truthful information about the effect of the ingredients on pain relief, and the pills suddenly have value to someone without prior knowledge about the ingredients. Finally, add a convenient distribution channel, and people without prior expertise can quickly find a product to meet their goal of attaining pain relief. Marketing that is truthful and nondeceptive matters for the better. But what happens when marketers stretch the truth, conceal material information, or, even worse, outright lie? What happens if the label on the pill bottle promises that

you will lose 20 pounds in two weeks? Marketing then matters for the worse.

Sadly, bad actors will always exist. I believe this, based on economic models of firm behavior (Darby and Karni 1973), two decades in the trenches at the Federal Trade Commission (FTC), and the wisdom of the founding fathers. As James Madison noted in Federalist 51, "If men were angels, no government would be necessary" (Hamilton and Madison 1788). This is why there is a role for government regulation of marketing. But what exactly should the government's role be? The finding of unintended consequences from the Nutrition Labeling and Education Act of 1990 (NLEA) goes right to the heart of this unresolved question (Moorman et al. 2012).

In this commentary I hope to achieve two goals. First, I place the work of Moorman, Ferraro, and Huber within a broad historical policy context. The NLEA involves a classic debate over the role of marketing in society. I was actively working on law enforcement and policy research regarding the use of health information in marketing when the NLEA was passed, and I believe that important nuances of the debate have been lost over time. In this essay I consider how subtle issues in the original debate lead to an alternative explanation for the findings of Moorman et al. Second, I use Moorman et al. (2012) as a springboard to highlight the need for more contributions by marketing researchers to inform and improve public policy. I note three broad policy questions that are begging for serious research and academic debate: (1) whether new behavioral economics theories of consumer decision making should overturn consumer protection laws based on a reasonable consumer model, (2) how marketing research can improve consumer information policies, and (3) whether privacy policies should be changed in response to research on consumer preferences and actual behavior.

In closing, I note that the debate over the role of marketing in society may ebb and flow, but it never fades away. Marketing scholars who take the time to become subject matter experts on important policy questions are well positioned to conduct research that can affect policy outcomes for decades. The debate over the use of health information in food marketing is one example, which is illustrated by a recent administrative court ruling involving claims for pomegranate juice.

Historical Context of Nutrition and Health Claim Regulation Suggests an Alternative Theory

The creative and heroic effort by Moorman et al. (2012) to measure the effects of the NLEA raises many fundamental questions about the role of government in marketing. They appeal to the economics of information literature and argue, correctly, that reducing the cost of searching for health information should improve consumer knowledge. This, in turn, should make it easier for people interested in diet and health to find products that meet their health goals, which, in turn, should improve incentives for firms to improve nutrition attributes. The authors test whether the NLEA spurred such competition by combining information on fat, sodium, cholesterol, and fiber into a single metric, and estimating how foods covered by the NLEA fared relative to control products. They conclude "that our results indicate that the NLEA resulted in lower brand nutrition. This unintended consequence is an important reminder that effective policy should be designed to align consumer and firm responses" (Moorman et al. 2012, p. 732). They further find that improvement in taste came about at the expense of nutrition, and they argue that this outcome occurs because consumers value taste more than nutrition and that the two attributes are negatively correlated. In light of these conclusions, they implicitly question the benefit of disclosure regulations and explicitly explore alternative consumer policies, including possible subsidies for "good" foods and taxes on "bad" foods.

In this commentary, I propose an alternative explanation for the seemingly surprising finding by Moorman et al. I argue that the post-NLEA environment was predictably less hospitable to nutrition competition than the pre-NLEA environment. Although the NLEA undoubtedly increased the supply of nutrient content information, it also stifled the flow of marketing linking diet to disease. The net effect may have been to dampen incentives to compete on health. I also discuss fundamental questions about the role of government in marketing that are raised by the NLEA. First, when should government prohibit commercial speech? Second, when should government compel commercial speech? I begin with a discussion of these broad questions and then explain why the NLEA may not have improved the overall information environment. I conclude with comments on policy recommendations made by Moorman et al. and a few thoughts on how the marketing research community can enhance government regulation of marketing.

There is little debate about the benefits of prohibiting fraudulent or deceptive marketing, particularly when claims involve credence characteristics—characteristics that consumers cannot easily verify themselves (Darby and Karni 1973). Most people would agree that there is a role for government to preserve property rights and prevent theft. The preservation of property rights is critical for the advancement of any society. A marketer who lies, substantially stretches the truth, or fails to disclose

material information is little more than a thief. Such actors cause obvious harm by stealing money from consumers and stealing business from legitimate competitors. They also cause less obvious harm. They steal time and money from people who take preemptive actions to protect themselves. They can thwart incentives to produce products that consumers truly desire. The seeds of distrust that they sow can also prevent mutually beneficial trades from taking place.

Government regulation of marketing beyond the prevention of fraud is more controversial. Much of the controversy involves two questions. First, when should government compel firms to provide information to consumers? Second, when should government prohibit the dissemination of accurate information that may help those who understand the information but possibly harm those who misunderstand the same information? What many policy makers don't realize is that marketing research is, as the case of the NLEA demonstrates, an important tool for understanding both these questions.

The first question—when to compel commercial speech—may appear to be simple. Policy makers often reason that people should have more information about a good or service, and they naturally conclude that laws compelling additional speech will improve society. The NLEA is just one example. Other examples include laws requiring miles-per-gallon ratings on cars, risk information on prescription drug labels, and Truth in Lending disclosures for a range of financial products. However, the success of disclosures depends on a number of factors. First, do relevant consumers want the information at the point of time required by statute? Second, do consumers understand the mandated information in a way that brings them closer to the truth about a product? Third, are the laws flexible enough to respond to changes in consumer needs or changes in the technical rationale for requiring a particular disclosure? In addition to questions about the probable effectiveness of disclosures, the legal authority for compelling some types of speech is still being tested, as illustrated by a federal court judge who blocked regulations requiring graphic warning pictures on cigarette packages in March 2012 (*R.J. Reynolds Tobacco Company, et al. v. U.S. Food and Drug Administration, et al.*, Civil Case No. 11-1482(RJL)).

Marketing researchers likely understand immediately why the answers to these three questions would be critical for the success of information regulations. Those unfamiliar with public policy might be surprised to learn that the techniques routinely used to test and develop marketing campaigns for consumer products are rarely used to develop or monitor reaction to mandated disclosures. In addition, although the marketplace is dynamic, once marketing regulations are adopted, regulators rarely reassess and revise them in response to changes in the information environment. As a result, disclosure remedies promulgated to help consumers can be ineffective or lead consumers to make worse, rather than better, decisions. For example, research on mortgages revealed that mortgage disclosure requirements in place for decades were often confusing and may have contributed to poor consumer choices and thus contributed to the current recession. The same research showed that with a little effort, government disclosures could be far more effective (Lacko and Pappalardo 2007, 2010).

The second question—when to prohibit the use of accurate information in marketing—is more nuanced. Some might argue that marketing is an inappropriate mechanism for conveying complex information, and thus even accurate marketing involving complex scientific evidence that might be misunderstood by a few consumers should be prohibited. A general distrust of marketing, explored in a recent editorial in this journal (Shugan 2006), is evident in the history of health claim regulations. Ironically, fat content information that is now required by the NLEA was once prohibited because regulators feared that some consumers would not understand how to use the information. By the late 1950s, scientists believed that the *type* of fat (not *total* fat) mattered for heart health. Doctors recommended that patients seek foods with healthful fat profiles, and manufacturers began to compete on heart health attributes. Regulators did not think the scientific evidence was strong enough to support marketing related to heart disease, so even accurate fat content information was prohibited in marketing for many years (Pappalardo and Ringold 2000). Economists have long argued that regulators should weigh the potential harm from allowing marketing based on uncertain science against the potential harm from prohibiting marketing based on uncertain science (Calfee and Pappalardo 1991).

Eventually, a more marketing-friendly approach to the policy debate emerged. To understand the potential benefits to consumers of this approach, let us revisit the pain reliever example above and apply the same logic to cooking oils. Imagine the plight of a shopper standing in the grocery aisle in search of cooking oil. Our shopper sees bottles labeled with claims about taste. Now, add information on the fat composition, and a shopper who already knows how different types of fat can improve health is able to identify oils that meet her goals. Now, add information linking different types of fat to heart health, and shoppers unaware of the science can begin to consider how fat composition is related to heart disease.

Regulatory history and advertising content research suggest that since the 1950s, the period most conducive to competition on diet and health most likely

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spanned the mid- to late 1980s. This was a period of bold challenges to the regulatory status quo that resulted in a 1987 proposal by the U.S. Food and Drug Administration to ease restrictions on health marketing for foods. Some thought the proposal went too far. Others, including FTC staff, thought it did not go far enough. In 1990, the NLEA established a compromise. Manufacturers were required to provide nutrient content information and were subjected to more restrictive regulation of health claims. In return, the NLEA provided manufacturers with preemption from a patchwork of state regulations. Taken together, two different content analyses of health claims in food advertising, spanning data from 1950 through 1997, indicate that the zenith of advertising about diet and health came about during the late 1980s (Pappalardo and Ringold 2000, Ippolito and Pappalardo 2002).

If the NLEA had the unintended consequence of deterring healthful product innovation, one possible explanation is that the NLEA limited the creativity, scope, and salience of health messages in marketing. Concern about such an effect is evident in a series of essays published in 1996 (Silverglade 1996, Petrucelli 1996, Pappalardo 1996). Silverglade believed that the NLEA appropriately put an end to a bevy of misleading health claims and would improve the information environment. Petrucelli believed that the NLEA would harm consumers by unduly restricting the flow of useful health information and unduly stifling incentives to compete on health. I wondered about the net effect of the NLEA and asked,

> How can researchers distinguish among effects caused by the mandatory nutrition labeling provisions of the NLEA versus its nutrition descriptor provisions versus its health claim provisions? In assessing the effects of and applying lessons from the NLEA to other information-regulation questions, it is important to understand the effects of these different policy elements (Pappalardo 1996, p. 155).

In short, a finding that the NLEA did not improve the healthfulness of food products as some had hoped is not entirely unexpected, as these concerns were raised about the NLEA from the beginning.

Moorman et al. (2012) briefly explore several new public policy initiatives based on their findings, including consumer education programs, R&D subsidies for firms, excise taxes on "bad" foods, and subsidies for "good" foods. An analysis of these policies is far beyond the scope of this essay. However, I would like to make a few general comments. First, all of these policies have costs and benefits. The likely net benefit of each would need to be evaluated according to a clearly stated policy objective. Second, it is not clear that a call for any of these policies follows directly from this research. Even if a composite measure of healthfulness for a sample of foods diminished following the NLEA, this does not necessarily mean that overall diets became less healthful. I also wonder how often people choose foods based on an overall healthfulness profile consistent with the study's key metric. People with postural orthostatic tachycardia, for example, search for high-sodium foods to meet a goal of ingesting 3,000 milligrams of sodium per day. Those who care about heart disease would likely focus on saturated fats but would not be particularly concerned about total fat. If the metric does not capture consumer decisions, then it may not be a good measure of nutrition improvements. Concern about heterogeneous consumer health needs automatically raises alarm bells about taxing or subsidizing particular foods. Imagine suffering from a chronic illness that requires sodium-loading, only to be taxed for purchasing high-sodium products.

Marketing Research for NLEA and Beyond

For better or worse, marketing and marketing regulations matter. When I step back and consider the findings of Moorman et al. (2012) within the bigger picture of marketing regulation, I can only sigh. Marketing researchers surely appreciate the power of marketing and understand the importance of capturing consumer attention in innovative ways. They also undoubtedly know how to pretest, evaluate, and adapt communication strategies to respond to different consumer demands in a dynamic environment. Yet society often fails to appreciate the value of marketing and consumer research, and this lack of appreciation is often reflected in government regulation.

What can the marketing research community do to improve marketing regulations? The community needs to find a way to bring its expertise into policy debates with greater regularity and vigor. The community should continue to foster research such as Moorman et al. (2012) to evaluate the effect of marketing regulations on marketing messages, consumer behavior, firm behavior, and health outcomes. I would also encourage the community to develop and communicate best practices for evaluating marketing messages to policy makers. Although information regulation sometimes has unintended effects, with better consumer research and more input from marketing researchers earlier in the process, many regulations can be substantially improved.

Let me suggest a few broad policy areas that would benefit greatly from more participation by marketing research academics. First, marketing researchers are curiously absent in current policy debates over alternative views of consumer behavior. In recent years, research and popular books promoting a "behavioral economics" view of consumer behavior have led to questions about whether policy makers should base

policy on assumptions that consumers are rational, reasonable, behaviorally biased, unreasonable, or irrational (see Pappalardo 2012). These different views yield very different policy recommendations, with different implications for consumer choice and consumer welfare. Consumer policy would benefit from more serious discussion among scholars from different disciplines to clarify just what evidence exists for different views of consumer behavior.

Second, related to the debate over different models of consumer behavior is the debate over the use of information disclosures as a consumer policy. A body of evidence shows that disclosures are not always read, and if read, they can inadvertently mislead consumers. At the same time, there is other evidence showing that disclosures can improve consumer knowledge and choices. Marketing researchers can help to inform debate over the pros and cons of disclosure remedies in several ways. First, they can develop best practices for disclosure research and explain to policy makers why consumer research is often necessary to ensure that communications will work as intended. Second, they may be able to conduct research to shed light on why consumers do not read certain types of disclosures. Finally, they can help to develop recommender tools that help consumers use information to make good choices (Lynch 2009, Sunstein 2011).

A third prime area for marketing research is privacy (Federal Trade Commission 2012b). Privacy policy debates would benefit from more academic marketing research. Concerns about consumer privacy on the Internet and in mobile environments could lead to very different rules for marketing through different mediums. Although there is some publicly available research to assess consumer attitudes toward privacy, debate over different privacy rules would be enhanced with more marketing research. In particular, there is a need for research that combines data on consumer preferences *and* consumer behavior. It would be helpful to know more about how much privacy people really expect, how much they are willing to pay for additional privacy, and what "free" services they might be willing to forgo for additional privacy.

Marketing scholars have much to contribute to consumer policy. For those interested in the area, I have a few suggestions. First, become a subject matter expert. If you intend to work on consumer policy, then contact people working in the area to make sure that you really understand the nuances of the relevant policy debate. Second, become part of the policy debate. Attend conferences and submit comments in response to Federal Register Notices of marketing regulations. Third, send research in progress to those working in government so that they know about your research. The more those who work on policy know about you and your research, the greater impact your research will have on policy analysis and policy outcomes.

The NLEA debate, like many debates involving marketing regulations, involves fundamental questions about the role of government in society. Such debates do not fade away. A May 2012 ruling by an administrative law judge illustrates this point. The case involved health claims for pomegranate juice. Siding with the FTC, the judge ruled that the marketer went beyond the science and made deceptive health claims. But this was not the end of the story. The judge questioned the standard of proof that would have been required for future health claims. Thus, debate over the appropriate level of scientific substantiation for health claims continues (ElBoghdady 2012, Federal Trade Commission 2012a, Sifferlin 2012, Watson 2012).

This ruling illustrates the tenacity of fundamental debates over the role of government regulation in commercial speech. It also illustrates the need to build strong bridges across generations of scholars. Each new generation of policy makers and scholars would likely find it beneficial to spend some time building on the work of prior generations. Otherwise, we are constantly reinventing the wheel and missing important nuances in our research. We also must continue to build strong bridges across disciplines. Such complex policy puzzles often require a multidisciplinary approach precisely along the lines encouraged by *Marketing Science*.

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References

Calfee JE, Pappalardo JK (1991) Public policy issues in health claims for foods. *J. Public Policy Marketing* 10(1):33–53.

Darby MR, Karni E (1973) Free competition and the optimal amount of fraud. *J. Law Econom.* 16(1):67–88.

ElBoghdady D (2012) Pom tests limits of FTC power with ad campaign. *Washington Post* (May 25) http://www.washingtonpost.com/business/economy/pom-tests-limits-of-ftc-power-with-ad-campaign/2012/05/25/gJQAHeBsqU_story.html.

Federal Trade Commission (2012a) Administrative law judge upholds FTC's complaint that POM deceptively advertised its products as treating, preventing, or reducing the risk of heart disease, prostate cancer, and erectile dysfunction. Press release (May 21), Federal Trade Commission, Washington, DC. http://www.ftc.gov/opa/2012/05/pom.shtm.

Federal Trade Commission (2012b) Protecting consumers privacy in an era of rapid change: Recommendations for business and policymakers. Report, Federal Trade Commission, Washington, DC.

Hamilton A, Madison J (1788) Federalist No. 51: The structure of the government must furnish the proper checks and

balances between the different departments. *New York Packet* (February 8).

Ippolito PM, Pappalardo JK (2002) Advertising nutrition and health, Evidence from food advertising 1977–1997. Staff report, Federal Trade Commission Bureau of Economics, Washington, DC.

Lacko J, Pappalardo JK (2007) Improving consumer mortgage disclosures: An empirical assessment of current and prototype disclosure forms. Staff report, Federal Trade Commission Bureau of Economics, Washington, DC.

Lacko J, Pappalardo JK (2010) The failure and promise of mandated consumer mortgage disclosures: Evidence from qualitative interviews and a controlled experiment with mortgage borrowers. *Amer. Econom. Rev.* 100(2):516–521.

Lynch JG Jr (2009) Information remedies, choice architecture and plain vanilla financial products. Discussion paper, Russell Sage Foundation, New York.

Moorman C, Ferraro R, Huber J (2012) Unintended nutrition consequences: Firm responses to the Nutrition Labeling and Education Act. *Marketing Sci.* 31(5):717–737.

Pappalardo JK (1996) Evaluating the NLEA: Where's the beef? *J. Public Policy Marketing* 15(Spring):153–156.

Pappalardo JK (2012) Product literacy and the economics of consumer protection policy. *J. Consumer Affairs* 46(2):319–332.

Pappalardo JK, Ringold DJ (2000) Regulating commercial speech in a dynamic environment: Forty years of margarine and oil advertising before the NLEA. *J. Public Policy Marketing* 19(1):74–92.

Petruccelli PJ (1996) Consumer and marketing implications of information provision: The case of the Nutrition Labeling and Education Act of 1990. *J. Public Policy Marketing* 15(Spring):150–153.

Shugan SM (2006) Who is afraid to give freedom of speech to marketing folks? *Marketing Sci.* 25(5):403–410.

Sifferlin A (2012) POM, not so wonderful: Judge rules juice's health claims are deceptive. *Time* (May 22) http://healthland.time.com/2012/05/22/pom-not-so-wonderful-judge-rules-juices-health-claims-are-misleading/.

Silverglade BA (1996) The Nutrition Labeling and Education Act: Progress to date and challenges for the future. *J. Public Policy Marketing* 15(Spring):148–150.

Sunstein CR (2011) Informing consumer through smart disclosure. Memorandum for the Heads of Executive Departments and Agencies, Executive Office of the President, Office of Management and Budget, Office of Information and Regulatory Affairs, Washington, DC.

Watson E (2012) Attorney: POM ruling is a "stunning rejection" of FTC's stance on "gold standard" clinical trials to support product claims. NutraIngredients-USA.com (May 22) http://www.nutraingredients-usa.com/Regulation/Attorney-POM-ruling-is-a-stunning-rejection-of-FTC-s-stance-on-gold-standard-clinical-trials-to-support-product-claims.

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Suggestions for Further Research on Firm Responses to NLEA and Other Disclosure Laws

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Using two secondary sources of data on the nutritional content of food items, Moorman et al. (2012) examine the impact of the Nutrition Labeling and Education Act (NLEA) on the supply of the nutritional content of different types of foods. The main part of their analysis is conducted on comprehensive listings of the nutritional content of different food brands as reported in Netzer (1991, 1994, 1997). Because these data were missing taste and price information, another data set from *Consumer Reports* was employed to confirm that the basic result of a negative impact of nutrition labeling holds up when controlling for taste and price. The study is noteworthy for its comprehensive coverage of categories and brands, use of a control group of products that were not covered by the NLEA, and careful and exhaustive empirical analysis of the two data sets. There is not much to say about the empirical analysis, so this comment will focus on examining the literature on information economics to try to shed light on the implications of firm behavior revealed by the results contained in Moorman et al. (2012).

The key empirical finding in Moorman et al. is that nutrition *declined* on average for brands that were required to have labels compared with brands that were not required to have them. There was also a negative trend in nutrition for all brands (Moorman et al. 2012, Table 3). To put the NLEA effect in perspective, its coefficient in Table 3 of -0.550 is less than 1% of average overall nutrition, which is approximately 70 (see Moorman et al. 2012, Table 2). So though it is statistically significant, the effect of the NLEA, on average, may not be large. Also, the effect is best interpreted as an average over the 30 categories and the brands in them, and it may not hold for any specific category or brand. The other confirmed hypotheses in Moorman et al. (2012) are that the NLEA had more of a positive effect for new brands, for firms with a smaller category share, and for low-health categories. Conversely, the effect of the NLEA was negative for large-portion categories, contrary to the authors' hypothesis. Finally, the analysis of the *Consumer Reports* data indicated a highly significant positive effect of the NLEA on taste. Overall, the results indicate that the NLEA brought about an increase in market segmentation with established, high-share brands competing only in taste while new brands that emphasize nutrition were introduced, and nutrition in low-health categories improved.

The authors conclude that the NLEA is an example of a well-meaning regulation that generates unintended consequences and that the observed changes will make consumers who value taste better off. They also suggest some actions that firms might take to improve the nutritional content of their brands. Not surprisingly, however, given the empirical focus of the paper, Moorman et al. do not attempt to model the incentives underlying the observed behavior. As we

shall see, mandatory disclosure can have a number of secondary effects that make constructing such a model very difficult.

Theories of Information Provision

Sorting out the incentives for firms and third parties to reveal information, and the effects of requiring firms to provide information, has been the focus of a large literature that cuts across economics, healthcare, finance, and marketing. An excellent review of theoretical and empirical work in this area is contained in Dranove and Jin (2010). Specifically, this review summarizes theories about information disclosure and mandatory disclosure by firms, as well as disclosure by third parties. It also summarizes empirical work on disclosure in the areas of education, food marketing and service, finance, healthcare, and online selling.

One important theoretical issue is why firms might withhold information rather than disclose it on their own. Given some very strong assumptions, including costless disclosure and homogeneous consumers, early theoretical work in this area indicated that sellers have an incentive to voluntarily disclose quality information (e.g., Grossman 1981). An extensive amount of research has examined what happens to firm incentives to disclose information if these assumptions are violated and what happens if information is provided by third parties or mandated by the government. Unfortunately, there does not appear to be a model in the current literature that captures all of the important incentives affecting firm reactions to the NLEA in one paper. However, there are a number of results that do point to some possible effects of the NLEA on firm behavior. In general, the effect of mandated information on welfare is surprisingly ambiguous because the information may have secondary effects on competition and product offerings, as well as the obvious effect of imposing costs of disclosure on sellers. The impact of mandatory disclosure may also depend on how well consumers are able to use the information. I will discuss these effects and how they might apply to the NLEA below.

With respect to the effects of mandatory disclosure on competition, Board (2009) shows that two possible motives for avoiding disclosure are to soften competition and to avoid revealing low quality. If the motive is to soften competition, mandatory disclosure makes the market more competitive and consumers better off. On the other hand, if the motive is to avoid revealing low quality, mandatory disclosure does benefit those who would have bought the low-quality brand. However, it also makes the market less competitive, allowing the high-quality firm to command a higher price, harming those who would have bought its product otherwise. Board's model addresses vertical differentiation. In the case of horizontal differentiation, Anderson and Reneault (2000) show that prior knowledge of a best-matching brand inhibits search and leads to higher prices. Consumers would collectively be better off if they had to search for the information because this would make the market more competitive. Reducing search costs can also trigger investments in a differentiated product (e.g., Kuksov 2004). Although the additional degree of choice benefits consumers, the increased differentiation may wind up softening price competition.

In sum, mandating information disclosure directly benefits the users of the information, but it may have secondary effects on competition. Most of the abovementioned results are obtained for stylized duopoly markets. Whether the secondary effects are important for the NLEA—which applies to markets with a number of sellers who sell more than one product—is an empirical question. However, the results outlined above would lead one to expect that the NLEA would have an impact on the prices of brands (or products) offering high nutrition. Though not tested directly, evidence in Moorman et al. (2012) suggests that this effect may have been positive.

Disclosure may also have an impact on investments in product attributes. Bar-Isaac et al. (2012) show that a reduction of search costs on one attribute relative to another can indirectly induce a firm to increase investments on that attribute and limit investments on the other dimension. The changes in investments lead to corresponding changes in the expected quality of the attributes. Thus, if the NLEA reduced search costs for nutrition, we should expect increased investments and increased quality on that dimension, and decreased investments and quality of the taste attribute. On average, the opposite seemed to happen. Moorman et al. (2012) attribute this to a lack of importance of nutrition, which may be correct, but this explanation may not tell the whole story. For example, the finding of an overall reduction in nutrition may result from segmentation in which there were investments in certain brands that emphasize nutrition while the nutrition attribute was abandoned for other brands. Consistent with this, we do see new brands that have increased nutritional value, and we also see increased nutritional value for low-health categories. Because it is a model of a single-product monopoly, the model of Bar-Isaac et al. (2012) cannot deal with segmentation.

Another relevant implication of Bar-Isaac et al. (2012) for understanding the NLEA and other disclosure laws is that sellers will invest in nutritional attributes covered by the labels because information on these attributes is readily accessible but ignore aspects of nutrition not covered by the mandatory labels. We hope the labels capture what is important.

Fishman and Hagerty (2003) study a case in which only some fraction m of consumers can make use of the disclosure (the informed consumers) and therefore receive more benefit from the product when disclosure is present. For example, only some fraction m of consumers may be able to use nutritional labels effectively in planning their diets. Fishman and Hagerty show that when m is small, mandatory disclosure benefits the informed consumers, has no effect on others, and makes the seller worse off, on average. This is because the seller would lose the business of the informed consumers when disclosure is mandatory and quality is low (e.g., the label reveals poor nutrition). At the same time, it would lose the business of the uninformed consumers if it raised prices when quality was high. When m is large, there is no benefit from mandatory disclosure because firms would disclose anyway. This paper has at least two implications for understanding the NLEA and other disclosure laws. One is that one should not expect a large proportion of consumers to benefit from the law: m has to be small for the disclosure law to have an impact. The other is to provide insight into why sellers typically oppose such laws: sellers are worse off if forced to disclose low quality. Conversely, one might expect a small group of consumers to favor the law and a larger group to be indifferent.

Whereas the above-mentioned articles discuss issues directly related to the NLEA, there are many other articles that discuss issues related to information disclosure in general. Two recent examples that present modeling frameworks that might be of use to researchers interested in this area are Levin et al. (2009) and Sun (2011). Levin et al. (2009) compare the disclosure policies of an oligopoly with those of a cartel or multiproduct firm when disclosure is costly, and they then compare these to welfare-maximizing policies that might be set by a social planner. Sun (2011) studies the disclosure policies of a monopolist with known vertical quality (e.g., taste) and an unknown horizontal attribute but does not consider the effects of mandatory disclosure.

The bottom line is that sorting out the effects of a mandatory disclosure law such as the NLEA on welfare requires that attention be paid to the possible secondary effects on prices, competition, investments in new products, and emphasis placed on different product attributes by sellers. Attention also needs to be paid to the ability of consumers to deal with the mandated information. Further theoretical and empirical research aimed at better understanding these effects would be useful.

Broader Issues

There are some broader issues raised by Moorman et al. (2012). The evidence in the paper indicates that there is a declining demand for nutrition while at the same time obesity has increased dramatically. Although standard analyses assume consumer sovereignty and that consumers will act in their own best interests, this evidence suggests that many consumers are inflicting long-term harm on themselves. To some extent, the model of Fishman and Hagerty (2003) is a useful vehicle for analyzing the behavior of those who do not care about nutrition: they are the uninformed consumers who do not know how to deal with relevant information. But more work on models that allow for consumers to act suboptimally due to a lack of information or ability to process it would be useful.

Whereas Moorman et al. (2012) focus on taste and nutrition as the key attributes, another key attribute may be convenience or time saving. For whatever reason, consumers appear to have substituted snacks for dinner (Moorman et al. 2012). Snacks are typically consumed quickly from the package or wrapper that they are purchased in, often while the consumer is engaged in some other activity. They may be purchased from vending machines—the ultimate in convenience. But many snacks are not nutritious. A traditional dinner involves gathering ingredients and spending time to turn them into a meal. It also takes time to eat the meal in a relaxed fashion. Again, a time-saving alternative is to obtain a frozen or "takeout" dinner that is likely to be less nutritious than a traditional dinner. It appears that the rising price of time relative to the purchase price of prepared foods may be responsible for the downward trend in demand for nutrition. This is a hypothesis that could use further examination, possibly with time budget data such as the American Time Use Survey.

Moorman et al. (2012) focus on the time before and after the NLEA was enacted, but it would be useful to know what has happened since then. It is possible that the law has had a longer-term impact, and increased awareness of nutrition has led to more positive effects over time. A similar study on more recent data might answer this question.

Conclusions

The empirical analyses in Moorman et al. (2012) is very well done, and I find myself in agreement with their policy and firm strategy recommendations. My degree of agreement increased as I was writing this paper. Nevertheless, there is a need for further theoretical and empirical research on the supply-side reactions to this and other disclosure laws. On the theoretical side, there is a need to better understand why segmentation into nutritional and taste segments was the sellers' best response to the NLEA. Empirically, there is a need to better understand the impact of the law on competition and pricing, and there is also a need to better understand why the law was

necessary in the first place. Along these lines, Fishman and Hagerty's (2003) hypothesis that only a small proportion of consumers would make use of the law could be tested. More broadly, there is a need to better understand the meaning of consumer welfare in cases where consumers might not act in their own best interests.

References

Anderson SP, Reneault R (2000) Consumer information and firm pricing: Negative externalities from improved information. *Internat. Econom. Rev.* 41(3):721–742.

Bar-Isaac H, Caruana G, Cunat V (2012) Information gathering externalities for a multi-attribute good. *J. Indust. Econom.* 60(1):162–185.

Board O (2009) Competition and disclosure. *J. Indust. Econom.* 57(1):197–213.

Dranove D, Jin GZ (2010) Quality disclosure and certification: Theory and practice. *J. Econom. Literature* 48(4):935–963.

Fishman MJ, Hagerty KM (2003) Mandatory versus voluntary disclosure in markets with informed and uninformed customers. *J. Law, Econom., Organ.* 19(1):45–63.

Grossman SJ (1981) The informational role of warranties and private disclosure about product quality. *J. Law Econom.* 24(3):461–483.

Kuksov D (2004) Buyer search costs and endogenous product design. *Marketing Sci.* 23(4):490–499.

Levin D, Peck J, Ye L (2009) Quality disclosure and competition. *J. Indust. Econom.* 57(1):167–196.

Moorman C, Ferraro R, Huber J (2012) Unintended nutrition consequences: Firm responses to the Nutrition Labeling and Education Act. *Marketing Sci.* 31(5):717–737.

Netzer CT (1991) *The Complete Book of Food Counts*, 2nd ed. (Dell Publishing, New York).

Netzer CT (1994) *The Complete Book of Food Counts*, 3rd ed. (Dell Publishing, New York).

Netzer CT (1997) *The Complete Book of Food Counts*, 4th ed. (Dell Publishing, New York).

Sun M (2011) Disclosing multiple product attributes. *J. Econom. Management Strategy* 20(1):195–224.

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From Consumer Information Regulation to Nutrition Competition: A Response

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We thank Dondeena Bradley, Janis K. Pappalardo, and Brian T. Ratchford for offering thoughtful commentaries on our paper. It is rare to have the combination of a business leader, a public policy maker, and a marketing scientist comment in this way. Therefore, we also thank Preyas Desai for selecting our article for this dialogue. The power of such dialogues lies in their generative quality. The comments offered expand the scope of our paper while raising several important questions and topics for future research.

A key objective of our paper was to more fully examine company reactions to the Nutrition Labeling and Education Act (NLEA). This viewpoint remains an underdeveloped perspective in research on consumer information regulation. We entered this study expecting asymmetric and strategic responses to the NLEA (e.g., Moorman 1998, Moorman et al. 2005) but were originally skeptical of the consistent decrease in nutrition after the implementation of the NLEA found in the Netzer data. However, when we analyzed the data in various ways, the same conclusion emerged. Accounting for the passage of time, including 30 product categories, resolving endogeneity as a result of omitted variables and simultaneity, using a separate *Consumer Reports* sample, and most telling, comparing food products mandated to have nutrition labels to control food products not required to have nutrition levels, we replicated the result over and over again. Given the importance of these findings, we appreciate the *Marketing Science* review team's conscientiousness in advocating for this range of tests.

The comments offered by Bradley, Pappalardo, and Ratchford raise important questions and ideas. We respond by providing evidence from the literature and from our data, as well as suggesting ideas to extend and enrich the dialogue. Three sections below discuss the general areas examined by our commentators: (1) the impact of more time in our study design, (2) the impact of the NLEA on consumer behavior, and (3) the impact of the NLEA on firm behavior and competition.

1. The Question of Time

The Nutrition Labeling and Education Act was passed by Congress in 1990 and implemented by May 1994. We used a multiple time-series, quasi-experimental control group design involving three periods of observation—two before the NLEA (1990 and 1993) and one after the NLEA (1996)—to extract baseline trends for both the control group (nonlabeled food brands) and the treatment group (labeled food brands). Both Ratchford (2012) and Bradley (2012) question whether we allowed enough time to pass for firms to improve brand nutrition in new or existing brands. We address this question in three ways.

First, we examine brand nutrition levels for one category using data beyond 1996 to see if additional time would have allowed us to observe an improvement in nutrition. We selected one category from our

data—pizza—that had both labeled (frozen pizza) and unlabeled (restaurant/delivery pizza) brands and that experienced the negative interaction at the category level that we observed across all our product categories for H1. Additional data for this category were collected from Netzer (2000, 2012), producing a large sample of brands sold in supermarkets and restaurants in 1999 ($n = 178$) and 2011 ($n = 332$). To examine the long-term effect of the NLEA, we take our two pre-NLEA period samples and replace the 1996 post-NLEA period sample with the 1999 or the 2011 post-NLEA sample. Results replicate the negative *NLEA* $*$ *Labeled brands* interaction for 1999 ($\beta = -2.20$, $t(72) = -2.08$, $p < 0.05$) and 2011 ($\beta = -19.06$, $t(78) = -12.22$, $p < 0.0001$), and they show the same pattern of nutrition decreasing for the labeled brands while increasing for the unlabeled brands. Future research should consider this longer-term response across a more complete set of categories and account for any historical events that might have influenced these longer-term outcomes.

A second way to address this question is to ask whether companies had sufficient time to respond to the NLEA over the six-year observation period of the study. We offer two answers to this question. First, our paper offers evidence that, on average, companies improved the nutritional quality of products new to the market while lowering the nutritional quality of existing products. This asymmetric response indicates that it was clearly possible for companies to make improvements to products during this period. Second, Griffin's (1997) analysis of product development activities by firms operating during this time period is relevant. Griffin finds that development time is a function of product complexity and product newness. Complexity of the product is captured in the number of functions delivered. Using her estimated parameters[1] and assuming that food products had two functions post-NLEA—to deliver taste and nutrition—we estimate that new products could have been developed in 16.8 to 25.8 months depending on the newness of the product (0% to 100% newness, respectively). If we further allow that firms had a formal development process and a cross-functional team, these estimates drop to 13.0 months for less complex products and 17.6 months for more complex products. Given these estimates, we think it reasonable to expect that firms could have responded to the NLEA with improved products.

A third way to address this question is to ask whether companies had the time to develop capabilities to create new products and new technologies to minimize important challenges such as the taste–nutrition trade-off. To this point, Moorman and Slotegraaf (1999) demonstrate that companies with both marketing and R&D capabilities made more and faster improvements to the nutritional quality of their brands. To what degree did companies, on average, have these capabilities at the time of the NLEA? Capabilities are usually thought of as organized routines for firm action that involve knowledge, skills, or competencies in a certain area. To examine whether companies had these capabilities, we examine firm actions that reflect these capabilities. Specifically, we examine the rate of development of new brands and the nutritional change of existing brands following the implementation of the NLEA. We discuss each in turn.

First, we identified the number of new brands and the number of firms and calculated a new brand-per-firm ratio in 1990 (*pre1-NLEA*), 1993 (*pre2-NLEA*), and 1996 (*post-NLEA*). This ratio increases from 0.99 new brands per firm in 1990, to 1.04 new brands per firm in 1993, and to 1.39 new brands per firm in 1996. Although the increase between these means is not significant, because the rate did not decrease, this offers support for the idea that the NLEA did not inhibit the introduction of new brands. Second, we examined the change in nutrition within existing brands and found an increase in the rate of change (reflecting both nutrition increases and decreases) to these brands. Specifically, we identified the brands that were present in both the *pre1-NLEA* and *pre2-NLEA* time periods or both the *pre2-NLEA* and *post-NLEA* time periods. We then calculated the difference in nutrition across the two time periods. Between the *pre1-NLEA* and *pre2-NLEA* periods, nutrition changed for 62% of the brands ($N = 160$) compared with 87% ($N = 212$) of the brands between the *pre2-NLEA* and *post-NLEA* periods ($\chi^2(1) = 31.11$, $p < 0.0001$). These figures indicate that companies had the ability to make changes to the nutrition of their brands and that this ability was exercised at an increasing rate following the NLEA.

1.1. Future Research

Although we think there was sufficient time for companies to respond to the NLEA, we agree with Bradley (2012) and Ratchford (2012) that it is interesting to consider the longer-term impact. Looking across the literature, we do not see studies examining this question. This is generally because consumers and firms are assumed to be responsive to quality information. However, this raises a research question—How long do markets take to transform? Part of the answer lies in the alignment of incentives between policy, consumers, and firms, which we will discuss in more detail in the next two sections. Another part of the answer lies in how consumers and firms learn about the policy. This perspective leads us to examine consumers' and managers' perceptions

[1] We utilize the beta coefficients from the *Development Time* (DT) equation in Table 6 in Griffin (1997).

of the label and the inferences they have about the impact of the label on markets.

Finally, we agree with Bradley (2012) and Ratchford (2012) that more time is important in one final respect. Specifically, we think it is likely that the NLEA may have required firms to alter their capabilities to innovate. Specifically, firms needed the ability to develop new products that performed better on nutrition but still tasted good. This type of reinvention is what strategy scholars call "dynamic capabilities" (Teece et al. 1997, Winter 2003), and it is not easy. It requires unlearning old ways and learning new ways, which takes time, money, and the will to change. Thinking about the NLEA as an external shock that prompted firms to develop new capabilities produces research questions about how new skills are acquired in an ongoing enterprise.

2. The Question of Consumer Behavior

We argue that because consumers care more about taste and because taste is negatively correlated with nutrition, companies did not improve nutritional quality. Instead, companies reduced nutrition and increased taste. The commentators raise several important questions about consumer behavior occurring in markets after the NLEA and the implications of our findings for consumer welfare. We address both in turn.

2.1. Consumer Behavior Mechanisms

Ratchford raises the interesting point that convenience or the desire for saving time may have been implicated in motivating consumers to focus less on nutrition (see also Chandon and Wansink 2012). As Ratchford (2012, p. 746) puts it, "It appears that the rising price of time relative to the purchase price of prepared foods may be responsible for the downward trend in demand for nutrition." The negative and significant time trend variable in our results in Table 3 (Moorman et al. 2012) supports the idea that the demand for nutrition was decreasing over time. Implicating the rising price of time would, as Ratchford argues, requires additional data that account for this cost relative to purchasing food products that vary on convenience. We think this is a very important direction for consumer research and urge scholars to contribute insights about this trade-off.

In our own data, we took the following steps to examine Ratchford's prediction. Specifically, if Ratchford's point holds, we should observe a decrease in nutrition for convenient products across both labeled and unlabeled products. To this idea, we asked two independent coders to assign our product categories to a convenient or inconvenient group, where *convenience* is defined as the preparation time and effort associated with products in this category.[2] Using that definition, nuts were assigned to the convenient group, whereas pork sausage was assigned to the inconvenient group.[3] We observe a significant two-way interaction of $NLEA * Convenience$ on brand nutrition ($\beta = 1.00$, $t(652) = 3.73$, $p < 0.001$); however, the pattern does not support the idea that convenient brands became less nutritious. Specifically, we observe that the nutrition of convenient brands did not change following the NLEA: $M_{\text{Pre-NLEA, Convenient}} = 73.62$ versus $M_{\text{Post-NLEA, Convenient}} = 73.57$. Inconvenient brands, on the other hand, showed a reduction in nutrition following the NLEA: $M_{\text{Pre-NLEA, Inconvenient}} = 55.38$ versus $M_{\text{Post-NLEA, Inconvenient}} = 54.63$. We also observe a significant three-way interaction of the $NLEA * Labeled\ brands * Convenience$ ($\beta = 1.29$, $t(652) = 2.30$, $p < 0.05$). Inspecting these means, we observe that the only group that decreased following the NLEA was the labeled inconvenient products. The three other contrasts (labeled convenient, unlabeled convenient, and unlabeled inconvenient) show no change. As before, these results do not support the idea that convenience is associated with a change in nutrition. Instead, a more complex budgetary view would need to account for the costs of convenience and the cost of knowing that the product is now more nutritious, which may make it seem less tasty. Other tests that include more categories and more nuanced measures of convenience could further test Ratchford's hypothesis.

Ratchford's query prompted us to search our data for additional evidence that consumers focus on taste and that the experience of a negative nutrition–taste inference is driving our firm results. Our test in this case is to examine whether nutritious brands lost market share following the NLEA. Before the NLEA, nutrition was hard for the consumer to discern. However, if our explanation is correct, we would expect that after the NLEA, brands scoring higher on nutrition would lose market share. To examine this question, we run a regression with brand market share as the dependent variable. We limit the analysis

[2] Another way to code convenience is according to whether or not the brand is sold in a restaurant. However, coding would confound our "labeled" brand variable with this convenience variable. Hence, we code as noted.

[3] Some product categories are ingredients and hence would not be eaten on their own, thereby limiting the convenience question. We restrict our analysis to the non-ingredients and therefore eliminate barbeque sauce, margarine, pancake syrup, salad dressing, sour cream, tartar sauce, and tomato sauce. The low-convenience categories are baked potato, french fry, fresh beef, fresh chicken, fresh pork, hash brown, pizza, and pork sausage. The high-convenience categories are baked bean, bread, cheese, Danish, English muffin, hot dog, ice cream, lasagna frozen dinner, muffin, nuts, peanut butter, potato chip, raisin bran cereal, soup, and steak frozen dinner.

to those brands that repeat at least once in the data to account for lagged market share. Given market share ranges from 0 to 1, we estimate the model using a logit model. Specifically, we estimate logit($Market\ share_{bt}$) $= \beta_0 + \beta_1 NLEA_{bt} + \beta_2 Nutrition_{bt} + \beta_3 NLEA_{bt} * Nutrition_{bt} + \beta_4 Market\ share_{bt-1} + \beta_5$–$\beta_{15} Category + e_{bt}$. We observe a significant negative interaction for the $NLEA * Nutrition$ interaction ($\beta_3 = -0.11$, $\chi^2(1) = 6.56$, $p < 0.05$), which indicates that brands with higher nutrition levels lost market share following the NLEA compared with brands with lower nutrition levels.[4] This analysis supports our theory by showing that market demand generally moved in a direction away from the more nutritious brands.

2.1.1. Future Research. Considering future research to sort out consumer behavior mechanisms, we think the work of Nelson offers an interesting opportunity. Nelson (1974) offers the provocative idea that regulation mandating disclosure might actually reduce consumer vigilance and search because consumers believe that regulation polices the market, and so they do not have to worry about deceptive claims or firm misbehavior. As Nelson (1974, pp. 749–750) notes, "There is another important source of deceptive advertising: the law. . . . Consumers are unlikely to be legal experts. Some, therefore, are likely to believe that certain forms of deceptive advertising are prevented by law when, in fact, they are not. . . . The more the law protects against fraud, the more people think the law protects against fraud." If this occurred in regard to the NLEA, consumers would not use nutrition information once it was required by the NLEA. To test this idea, research should examine whether new nutrition labels reduce consumer skepticism toward products and companies.

2.2. Consumer Welfare Implications

Several questions raised by our commenters examine the consumer welfare implications of our findings. These can be broadly grouped into questions about whether our results reflect actual consumer purchasing behavior and what our findings imply for economic models of consumer welfare.

Bradley (2012) and Pappalardo (2012) question whether our results about lower brand nutrition hold when accounting for the market share of brands. Specifically, if nutrition decreased in brands following the NLEA but consumers shifted their purchases away from these brands, then actual total nutrition consumption may have increased. In Bradley's (2012) words, "It is possible . . . that consumers shifted their purchases toward more nutritious products during that period" (p. 739). In Pappalardo's (2012) words, "Even if a composite measure of healthfulness for a sample of foods diminished following the NLEA, this does not necessarily mean that overall diets became less healthful" (p. 742). Considering these points, we examine the effect of the NLEA on nutrition for the labeled brands, weighting the results by the market share of the brand (recall that we do not have market share information for the unlabeled brands). As shown in the NLEA-only model in Table 4 of Moorman et al. (2012), there is a negative effect of the NLEA on brand nutrition ($\beta = -0.639$, $t(329) = -2.24$, $p < 0.05$) for the labeled brands, with the model controlling for time trend, brand market share, firm category market share, and product category. We reran this model, weighting by brand market share, and replicate the negative effect of the NLEA on brand nutrition ($\beta = -0.342$, $t(321) = 1.88$, $p < 0.07$). Our analysis in §2.1 showing that brands with higher nutrition levels lost market share following the NLEA also offers evidence that, on average, consumers did not switch to healthier brands after the NLEA.

Pappalardo (2012) also worries that our aggregate measure of nutritional quality may not be a valid reflection of what consumers focus on in their purchases. She argues, "I also wonder how often people choose foods based on an overall healthfulness profile consistent with the study's key metric" (p. 742). The nutrition measure for the Netzer data averaged four different nutrients: total fat, sodium, cholesterol, and fiber. We made this choice because we sought a metric that would be applicable to the majority of consumers who seek a well-balanced diet with desirable levels of all nutrients. To examine the generalizability of our results, Moorman et al. (2012) examine individual nutrients in our robustness checks (see the appendix and Footnote 19).

The second set of questions focuses on the consumer welfare implications of our findings and of mandated disclosure in general. Ratchford (2012) adopts a welfare perspective in considering the gains and losses from information. First, he reviews a number of models that focus on the impact of consumer heterogeneity in the value placed on nutrition, where some consumers value it and others do not. Disclosure only benefits those consumers who value information, and that segment may be small. Second, Ratchford points out that mandated disclosure can be shown to increase price both for vertically differentiated markets where higher nutrition is universally valued and for horizontally differentiated markets where nutrition is valued by some, but not all, consumers. In the case of vertical

[4] We do not examine the three-way interaction involving the $NLEA * Labeled\ brands * Nutrition$ because we do not have market share information for the unlabeled brands in our sample. The market share information for the labeled brands comes from the IRI *Marketing Factbook* (accessed through Wharton Research Data Services; https://wrds-web.wharton.upenn.edu/wrds/), which does not contain information on the brands sold in restaurants or fresh meats/nuts.

differentiation, mandated disclosure may make markets less competitive because now firms higher on nutrition can charge a higher price, thereby harming consumers who would have bought the product without the disclosure. In the case of horizontal differentiation, disclosure limits the need for search, thus raising the value of the best brand.

To examine the effects on price, we investigate the relationship between price and nutrition before and after the NLEA using our *Consumer Reports* data. Moorman et al. (2012) already report a positive relationship between nutrition and price (see p. 732). To this, we add a model that accounts for the effect of the NLEA. Specifically, we estimate $Price_{bt} = \beta_0 + \beta_1 NLEA_{bt} + \beta_2 Nutrition_{bt} + \beta_3 NLEA_{bt} * Nutrition_{bt} + \beta_4 Taste_{bt} + \beta_5 Time\ trend + \beta_6 - \beta_{16} Category + e_b + e_{bt}$.[5] Results indicate a positive main effect for nutrition and a positive and significant interaction of nutrition and the NLEA on price. These results show that nutritious brands generally cost more money and that these costs increased following the NLEA. Thus, consumers seeking nutrition may be worse off because they have to pay higher prices whereas firms may be better off because of the higher prices. This high price did not lure companies into this market, however, presumably because of the small size of segments that care about nutrition.

2.2.1. Future Research. Considering future research in this area, Bradley (2012, p. 739) asks, "Which . . . labels . . . are clearest to consumers? Which actually inspire them to value nutrition more highly? Which have the power to be the most effective, and why?" One possibility that we raise and Bradley advocates is the use of front-of-package (FOP) labels. These labels offer simple and intuitive summary evaluations of nutrition (e.g., red, yellow, and green color coding or a simple summary score). The conundrum is that although these labels may "inspire" consumers to think about nutrition at the point of sale, recent research indicates that these labels may be misleading (Andrews et al. 2011). If FOP labels encourage consumers to read and review the Nutrition Facts label and come to an educated choice, then consumers may still benefit. If FOP labels are used by consumers as a heuristic for overall nutrition that dissuades the use of more detailed nutrition information, as reported to occur by Andrews et al. (2011), these labels should be more tightly regulated. More research is needed to address Bradley's questions.

Pappalardo (2012) appropriately believes that better insights are necessary about consumer behavior to drive the effective design of regulations. Without such consumer insights related to the search for and processing of label information, regulators cannot foresee the type of failures we document in our paper. Both regulators and scholars interested in this area can pursue two important directions. First, consumer research has a long and rich history of scholarship examining consumer behavior in policy contexts (e.g., Bettman 1975, Bettman et al. 1986, Mazis et al. 1981, Russo et al. 1986, Scammon 1977, Wilkie 1975). Many of these foundational papers lay out general principles for vetting consumer policy options. Second, as noted by Pappalardo, recent behavioral economic theories that build on these and other models of consumer decision making should also be used to guide policy choices (e.g., see Chandon and Wansink 2012 for a good summary). For example, even though nutritional information is accessed, its net impact in the market can be negative as a result of inferences and associations. Specifically, believing that a product is healthier can lead to greater consumption of the product and the license to consume lower-nutrition products (Chandon and Wansink 2007). These points are relevant to our paper because both health halo and licensing could contribute to the negative shift in nutrition that we observed following the NLEA. Both generations of research offer immense value, and we hope that a greater number of mainstream consumer researchers will begin to work on these vexing policy problems. So much is at stake, and this is an area where these scholars can offer important insights.

We appreciate that regulatory rules appropriately need to follow elaborate procedures to minimize the negative impact of regulations on either businesses or consumers. However, we agree with Pappalardo that regulatory bodies could also benefit from using consumer-based tests and criteria similar to those that marketers use to assess the impact of advertising and point of sale. Without such tests and criteria, we end up with available and accurate information that has a very low usage rate (see Mazis et al. 1981). We hope that future research will offer insight into metrics that predict the use of information disclosure. In the spirit of our findings, however, we also advise regulatory officials to vet policy decisions with individual managers and companies to understand managers' perceptions of and intentions to respond in the way policy makers anticipate.

3. The Question of Firm Behavior

A final set of questions about firm responses to the NLEA was raised by Pappalardo (2012) and Ratchford (2012). We begin by examining Pappalardo's alternative explanations for the firm nutrition response and then entertain Ratchford's suggestions about how

[5] This model follows the two-stage least squares approach used for the two other models to test our *Consumer Reports* data (see Models 4 and 5 in Moorman et al. 2012). Instruments for taste and nutrition are used in the first stage of the model.

mandated disclosure affects competition. We close by considering how disclosure fits into the arsenal of public policies that can be used to improve the market for consumers and competitors.

3.1. Alternative Explanations of Unintended Firm Nutrition Response

Pappalardo (2012) proposes an alternative explanation for our finding that firms decreased nutrition and increased taste. Her explanation is that the "post-NLEA environment was predictably less hospitable to nutrition competition than the pre-NLEA environment" because it "stifled the flow of marketing linking diet to disease" (p. 740). Specifically, companies claiming that their brands had high or low levels of a nutrient or that these nutrient levels could be linked to the reduction of disease are more tightly regulated under the NLEA.

Our response to Pappalardo's argument is derived from the central findings in our paper. Our results show that although brand nutrition decreased overall, companies improved nutrition in new brands. We observe the negative effect of the NLEA turning positive in the interaction of *NLEA* ∗ *New brand*. If Pappalardo is correct, we would not see that post-NLEA brand innovations are more nutritious. We argue, instead, that managers of existing brands reasoned that they should not put current brands at risk given the nutrition–taste trade-offs consumers were expected to make. Second, we also observe that nutrition increased in the lowest-health categories (e.g., Danish, french fry, hash brown, and potato chip). These effects would not occur if the NLEA had a dampening effect on nutrition because it restricted competition.

Pappalardo's own research suggests a more complex and nuanced effect of the NLEA on health and nutrient claims as opposed to a competition-dampening story. First, the Ippolito and Pappalardo (2002) study, which examined over 11,000 food advertisements in eight magazines from 1977 to 1997, finds an *increase* in the use of new/improved claims, which could be related to the development of nutritionally improved products (p. E-3).

Second, Ippolito and Pappalardo (2002) show a shift in claim emphasis following the NLEA. For example, specific nutrition claims, such as the total fat level, have remained stable since the implementation of the NLEA with approximately 50% of advertised products having this type of information claim (Ippolito and Pappalardo 2002, p. E-22). Other types of claims, such as level claims (e.g., x grams of fat) or comparative claims (e.g., less fat), decreased following the NLEA. Considering specific nutrients, claims about sodium decreased, claims about fiber or bran showed fluctuations but no change in the trend, and calcium and other vitamin and mineral claims appeared to rise following the NLEA (Ippolito and Pappalardo 2002, p. 47). General nutrition claims, including terms such as "healthy," "lean," "light," "good for you," or "natural," fell following the NLEA (Ippolito and Pappalardo 2002, p. E-7). Considering more complex health claims, results show that disease claims (linking a nutrient to a disease) and affiliated claims (linking a nutrient to a condition closely affiliated with a disease, such as in the case of high cholesterol) both decreased following the NLEA but rebounded by 1997 to 72% of the peak level (Ippolito and Pappalardo 2002, p. E-9). This shift in focus is also apparent in other research examining claims, which shows a modest decrease in nutrient claims but a sizable increase in the use of health claims (Caswell et al. 2003). Looking at these patterns, it is difficult to conclude that the NLEA had a consistent dampening effect on competition.

Third, another explanation for the shifting use of nutrition and health claims following the NLEA is that the law rooted out and eliminated deceptive nutrient and health claims. Caswell et al. (2003) show how the NLEA affected the quality of nutrient and health claims through standardized approaches to the use of a range of claims, such as healthy, light, fat-free, etc. In a longitudinal study of claims made before and after the NLEA, the authors find that nutrient claim compliance increased significantly, from 73% in 1992 to 85.2% in 1995 to 90.1% in 1999. A similar long-term increase was observed for health claims: 60% (1992), 52% (1995), and 90% (1999). Hence, another explanation for the choice not to use health and nutrient claims to compete on nutrition was that prior claims did not meet legal standards. We view clearing out potentially deceptive claims as a boost to welfare, as consumers can more credibly use nutrition information to make informed choices.

Fourth, Ippolito and Pappalardo (2002, p. 36) show that nearly all claims associated with products decreased during the NLEA period. This included fewer claims for promotional offers, price, cost, coupons, suggestions for use, variety, convenience, quickness and ease, taste, aroma, and texture. These firm strategies could be viewed as a control group against which nutrition and health claims might be compared.

3.2. Firm Incentives to Compete on Nutrition

Ratchford (2012) offers an excellent review of the literature about the effects of disclosure on competition. We greatly enjoyed reading these papers and encourage scholars working in this area to consider these models in more detail. A central issue in this literature is whether firms need to be mandated to disclose or whether disclosure will happen of its own

accord. If mandated, what are the impacts on consumers and competition? The most widely used theory of quality information is the idea of "unraveling," which Ratchford describes in his comments. One challenge to this idea is that many of the assumptions important to its operation are not met in practice (see Dranove and Jin 2010), including vertical differentiation along a single feature of quality and homogeneous consumers. As a result, voluntary disclosure of quality information is often incomplete, as was nutrition information when the NLEA was passed by Congress. This leaves consumers in a position where they cannot easily discern quality levels, and quality improvements to nutrition are highly varied (Mathios 2000) and sometimes deceptive.[6]

Across the papers reviewed by Ratchford, there appears to be a set of fairly common conditions in which mandated disclosure offers important benefits while still imposing a cost on firms. Despite this, as Ratchford (2012, p. 745) notes,

> Unfortunately, there does not appear to be a model in the current literature that captures all of the important incentives affecting firm reactions to the NLEA in one paper. . . . In general, the effect of mandated information on welfare is surprisingly ambiguous because the information may have secondary effects on competition and product offerings, as well as the obvious effect of imposing costs of disclosure on sellers.

We examined questions about consumer welfare in the prior section of our response. Here, we focus on questions about firm incentives to compete on nutrition.

First, Ratchford (2012) suggests that our finding of an overall reduction in nutrition may result from segmentation of the market and selective investments in nutrition. Specifically, he views our findings that new brands and low-health categories increased in nutrition as evidence of segmentation in the market in which nutrition was abandoned for some brands while emphasized in other brands. He notes that these results run counter to Bar-Isaac et al. (2012), who predict that a reduction of search costs on one attribute relative to another can indirectly induce the firm to increase investments on this attribute and limit investments on other attributes. However, Bar-Isaac et al. offer only a model of a single-product monopoly, which does not allow for segmentation. Several of our moderating conditions allow segmentation and perhaps extend the Bar-Isaac et al. model in important ways. Future research should account for this heterogeneity when examining firm response to mandated disclosure.

Second, Ratchford examines the models of Board (2009), who argues that mandated disclosure benefits consumers when firm quality levels are reasonably close. However, in a complex marketplace where consumers have dozens of brand options in each category and even more numerous options across categories that can fill the same need, nutrition offerings are very heterogeneous. In this situation, it is not clear how managers will think about competition. Economic models on this topic simply do not address what type of competition might result. Our results from the prior section indicate that the price of nutrition did increase following the NLEA, possibly because companies were covering their costs and segmenting the market to focus on customers who value nutrition. Our results also indicate that firms did compete in selective and strategic ways on nutrition in a post-NLEA environment. New brands and low-health categories were the focus of this competition. We argue that companies understand consumers' valuations of taste over nutrition, and they rationally and selectively changed their strategies to focus less on nutrition, except in certain markets and for certain products. Future research should work on developing a formal model that would predict this type of firm behavior.

Once disclosures are required, firms can reduce quality from the predisclosure period without consumer awareness. This could have occurred with the NLEA because most consumers did not know what nutritional quality was before the NLEA. Therefore, a reduction in nutrition could go unnoticed by consumers and may even be rewarded by those that value taste over nutrition. Furthermore, there are a number of actual or expected competitive dynamics between companies that might emerge from how managers think about disclosure and its effects on competition. We consider a set of these factors in the following paragraphs.

First, the presence of clearer nutrition metrics may make a manager reluctant to compete on nutrition out of fear that any improvements might be easily matched by competitors. Managers may reason that it is easier to compete on a more ambiguous attribute such as taste. Therefore, by creating standardized metrics on nutrition, the NLEA may paradoxically make it less profitable to compete on nutrition. Second, managers may not improve nutrition if they think it will stimulate price cutting or taste increases by competitors. In support of this, Chen and Xie (2005) observe that it is not always optimal for a firm with a product

[6] The work of Gabaix and Laibson (2006) also demonstrates that a firm may have an incentive to educate consumers about the hidden costs of attributes only if the company can maintain a higher price and get consumers to switch to it. However, this situation does not arise, so attributes remain shrouded except to sophisticated consumers who use their knowledge to purchase wisely. This equilibrium is tolerated because firms and sophisticated consumers take advantage of one another's exploitative practices.

that performs well on a quality attribute to spread the good news about that product because it may motivate price cutting (and/or taste enhancements in our context) by competitors with weaker brands.

Finally, managers may have believed that competitors would choose to compete on nutrition, and hence this position would be crowded and less defensible than competing on taste. We have exploratory evidence to support this view. Specifically, one year prior to the NLEA (May 1993), Moorman (1998) sent surveys to managers for food brands in the market at the time. In addition to rating brand nutrition, managers were asked to rate the extent to which they agreed with the following statement about the effect of the new (NLEA) nutrition labels on their firms and competitors' reactions: "The new label requirements are likely to create a great deal of competitive activity on nutritional qualities for brands in my product category." We examined the extent to which this managerial belief is related to the change in nutrition among the brands in our samples. To do so, we calculated the average beliefs across managers in nine product categories and examined the correlation of these competitive beliefs with the average change in nutrition in a category from *pre2-NLEA* to *post-NLEA*. Results indicate a significant negative relationship between managers' ratings of competitors' responses to nutrition disclosure and the average change in nutrition in the category for the *Consumer Reports* data ($r = -0.676$, $p < 0.05$) and for the Netzer data ($r = -0.715$, $p < 0.05$). These exploratory findings are consistent with the idea that increases in managers' expectations that competitors would focus on nutrition following the NLEA were correlated with smaller nutritional improvements in these categories.

3.3. The Value of Mandated Disclosures

Pappalardo (2012, p. 740) suggests that we "implicitly question the benefit of disclosure regulations and explicitly explore alternative policies, including possible subsidies for 'good' foods and taxes on 'bad' foods." We do not agree with this characterization of our work. Instead, what we offer is one condition in which consumer information regulation may not promote firm competition, which is an important assumption that economists advocating consumer information regulation make (Federal Trade Commission 1979). Although the labels gave consumers the opportunity to search for and process nutrition information at the point of sale, this did not spur competition on nutrition. Therefore, we argue that for consumer information policy to spur competition, the policy must force the disclosure of an attribute that is valued by consumers, and this attribute should not be negatively correlated with the consumer's most valued attribute (taste, in this case). Unfortunately, in the case of the NLEA, consumers care more about taste than nutrition, and nutrition is perceived to be negatively correlated with taste. As we describe in Moorman et al. (2012, p. 732), "Labels may not stimulate quality improvements on the disclosed attribute as firms focus on the more important attribute." We offer an important limiting condition for when market responses should not be expected to follow from consumer information remedies. This does not negate the importance of increasing the availability, accessibility, and truthfulness of nutrition information at the point of sale, which the NLEA heartily accomplished. Finally, we offered alternative policy approaches for motivating consumers to select and firms to create healthy alternatives. If information remedies can work alone, we agree with Pappalardo that these alternative approaches are superfluous.

4. Summary

We thank our three commentators for their thoughtful and thorough analyses of our work. The opportunity to reflect with leaders in government, industry, and the academic community has been an enriching experience for us as we prepared this response. We hope that this dialogue provides an incentive for others to join the debate. Consideration of the firm, government, and consumer interface is rare in our field. However, the most vexing problems of health, environment, and commerce can only be solved through consideration of the incentives, perceptions, and behaviors of these players.

References

Andrews JC, Burton S, Kees J (2011) Is simpler always better? Consumer evaluations of front-of-package nutrition symbols. *J. Public Policy Marketing* 30(2):175–190.

Bar-Isaac H, Caruana G, Cunat V (2012) Information gathering externalities for a multi-attribute good. *J. Indust. Econom.* 60(1):162–185.

Bettman JR (1975) Issues in designing consumer information environments. *J. Consumer Res.* 2(3):169–177.

Bettman JR, Payne JW, Staelin R (1986) Cognitive considerations in designing effective labels for presenting risk information. *J. Public Policy Marketing* 5(1):1–28.

Board O (2009) Competition and disclosure. *J. Indust. Econom.* 57(1):197–213.

Bradley D (2012) Further examining the impact of the NLEA on nutrition. *Marketing Sci.* 31(5):738–739.

Caswell JA, Ning Y, Liu F, Mojduszka EM (2003) The impact of new labeling regulations on the use of voluntary nutrient-content and health claims by food manufacturers. *J. Public Policy Marketing* 22(2):147–158.

Chandon P, Wansink B (2007) The biasing health halos of fast-food restaurant health claims: Lower calorie estimates and higher side-dish consumption intentions. *J. Consumer Res.* 34(3):301–314.

Chandon P, Wansink B (2012) Does food marketing need to make us fat? A review and solutions. *Nutrition Rev.* Forthcoming.

Chen Y, Xie J (2005) Third-party product review and firm marketing strategy. *Marketing Sci.* 24(2):218–240.

Dranove D, Jin GZ (2010) Quality disclosure and certification: Theory and practice. *J. Econom. Literature* 48(4):935–963.

Federal Trade Commission (1979) *Consumer Information Remedies* (Government Printing Office, Washington, DC).

Gabaix X, Laibson D (2006) Shrouded attributes, consumer myopia, and information supression in competitive markets. *Quart. J. Econom.* 121(2):505–540.

Griffin A (1997) The effect of project and process characteristics on product development cycle time. *J. Marketing Res.* 34(1):24–35.

Ippolito PM, Pappalardo JK (2002) Advertising nutrition and health: Evidence from food advertising, 1977–1997. Staff report, Federal Trade Commission Bureau of Economics, Washington, DC.

Mathios AD (2000) The impact of mandatory disclosure laws on product choices: An analysis of the salad dressing market. *J. Law Econom.* 43(2):651–677.

Mazis MB, Staelin R, Beales H, Salop S (1981) A framework for evaluating consumer regulation. *J. Marketing* 45(1):11–21.

Moorman C (1998) Market-level effects of information: Competitive responses and consumer dynamics. *J. Marketing Res.* 35(1):82–98.

Moorman C, Slotegraaf RJ (1999) The contingency value of complementary capabilities in product development. *J. Marketing Res.* 36(2):239–257.

Moorman C, Du R, Mela CF (2005) The effect of standardized information on firm survival and marketing strategies. *Marketing Sci.* 24(2):263–274.

Moorman C, Ferraro R, Huber J (2012) Unintended nutrition consequences: Firm responses to the Nutrition Labeling and Education Act. *Marketing Sci.* 31(5):717–737.

Nelson P (1974) Advertising as information. *J. Political Econom.* 83(4):729–754.

Netzer CT (2000) *The Complete Book of Food Counts*, 5th ed. (Dell Publishing, New York).

Netzer CT (2012) *The Complete Book of Food Counts*, 9th ed. (Random House, New York).

Pappalardo JK (2012) Are unintended effects of marketing regulation unexpected? *Marketing Sci.* 31(5):739–744.

Ratchford BT (2012) Suggestions for further research on firm responses to NLEA and other disclosure laws. *Marketing Sci.* 31(5):744–747.

Russo JE, Staelin R, Nolan CA, Russell GJ, Metcalf BL (1986) Nutrition information in the supermarket. *J. Consumer Res.* 13(1):48–70.

Scammon DL (1977) "Information load" and consumers. *J. Consumer Res.* 4(3):148–155.

Teece D, Pisano G, Shuen A (1997) Dynamic capabilities and strategic management. *Strategic Management J.* 18(7):509–533.

Wilkie WL (1975) *Assessment of Consumer Information Processing Research in Relation to Public Policy* (Government Printing Office, Washington, DC).

Winter SG (2003) Understanding dynamic capabilities. *Strategic Management J.* 24(10):991–995.