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Health Claims in Food Marketing: Evidence on Knowledge and Behavior in the Cereal Market

Pauline M. Ippolito and Alan D. Mathios

This study examines the ready-to-eat cereal market during a period in which producers were initially prohibited from advertising cereals' health benefits but were later permitted to make health claims. Results indicate that producer health claims led to significant increases in consumer knowledge of the fiber-cancer relationship, in fiber cereal consumption and in product innovation. Government and general information sources had limited impact on fiber cereal choices in the years prior to the advertising, despite the accumulation of scientific evidence linking fiber to colon cancer. Most segments of the population increased their fiber cereal consumption once health claims were added to the market, but some informationally disadvantaged segments that had responded less to government and other sources of information responded disproportionately to health claims compared to other segments. These findings suggest that policies governing producers' use of health claims should be evaluated not only on how well they control deceptive or misleading claims, but also on how well they encourage producers to disseminate evolving health information to consumers.

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Introduction

In recent years the scientific evidence linking dietary choices to health has grown substantially, and research on this topic is continuing at a rapid pace. The value of disseminating this developing scientific information to consumers is potentially quite large. For instance, in the United States, five of the top ten causes of death have been substantially linked to diet [U.S. Surgeon General 1988], and there are numerous indications that the average American diet deviates significantly from the dietary recommendations of public health authorities [National Research Council 1989].

The question of how best to communicate evolving diet-health information to consumers has been much debated in policy circles. In particular, recent attention has focused on whether food producers should be allowed to disseminate diet-health information with health claims for their products, and if so, how such claims should be regulated. At the core of this debate are widely varying presumptions about producers' effectiveness in reaching consumers compared to, or in addition to, other information sources, such as government public education efforts. The effectiveness of alternative regulatory approaches in deterring potential deception in producer claims and in inhibiting the dissemination of truthful information to consumers is also a strongly contested issue.

This paper does not attempt to resolve this basic policy debate. Rather, it reports a variety of evidence on one key aspect in the debate: the potential costs of regulatory policies that limit the relatively unrestricted use of truthful health claims. In particular, the study analyzes the cereal market during a period when producers were initially prohibited from making health claims for their products but were then allowed to make such claims.¹

The cereal market was examined for several reasons. The current health claims policy debate was stimulated by claims in this market. Also, there is detailed brand-level data available on cereal innovation and sales for several years before and after the removal of the ban on health claims. This allows an examination of whether aggregate behavior changed once health claims were allowed. Moreover, detailed survey data is available on food consumption, including individuals' cereal consumption by brand before and after the use of health claims. This allows an

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examination of behavior by demographic groups under both policies. Finally, there is survey evidence on consumer knowledge of the fiber-cancer link that covers this period, allowing a direct assessment of knowledge and a test of the relationship between knowledge changes and behavioral changes. Overall, these data provide a unique opportunity to examine the effectiveness of producers in disseminating diet-health information and the information's effects on market behavior.

The results indicate that government and general sources of diet-health information did not reach many consumers who would have been willing to change their behavior if they had been informed of the fiber-cancer link. The evidence suggests that the removal of the ban against health claims made available an important new source of information for consumers in the cereal market. The consumer knowledge data, evidence on new product development, cereal sales data, and individual consumption data all indicate that producer health claims had a significant effect on the market. This new information led to greater awareness of the fiber-cancer issue, to enhanced development of more nutritious cereals, and to increased consumption of fiber cereals, especially by informationally disadvantaged groups, which had not been well reached by government and other sources of diet-health information.

If these results from the cereal market are broadly indicative of the potential of health claims in other markets, they have important implications for the current debate about how best to regulate health claims. In particular, these results suggest that, as much as possible, regulations should attempt to preserve the power of advertising to reach and effectively communicate truthful diet-health information. Of course, this does not suggest that policies to control deceptive or misleading claims should be ignored. Deception harms consumers and makes it more difficult for producers to credibly convey truthful information in the market. However, these results suggest that in assessing policies for governing producer health claims, policies should be evaluated not only on how well they discourage deceptive or misleading claims, but also on how well they encourage producers to disseminate truthful diet-health information and preserve producer incentives to improve the nutritional characteristics of food products.

Developments in the Cereal Market

Cancer of the colon is the second leading cause of cancer deaths in the United States [Greenwald et al. 1987]. By the mid 1970s a substantial body of epidemiologic research had developed suggesting a link between the consumption of insoluble dietary fiber and the incidence of colon cancer. Research on the topic continued through the 1980s, providing growing evidence of fiber's potential cancer prevention effect.² By 1979, the Surgeon General was publicly recommending an increase in fiber consumption as "prudent." Since many cereals are a rich source of insoluble fiber, effective communication of the growing evidence on the potential link between fiber and colon cancer should have led consumers to increase their consumption of fiber cereals beginning in the mid 1970s.

In October 1984, the Kellogg Company, with the cooperation of the National Cancer Institute (NCI), began an advertising campaign that focused on the link between fiber and cancer and highlighted the fiber content of some of its cereals. This campaign was in direct violation of long-standing Food and Drug Administration (FDA) policy in the area, which essentially created a ban on health claims for food products.³ The Kellogg campaign became the stimulus for a full review of government policy toward health claims in food promotion. While new regulations were considered, the ban against health claims was suspended.

As in any study of regulatory change, caution is warranted in considering whether changes in market behavior can be attributed to the event under study. Of particular concern is the possibility that other contemporaneous events will

confound the analysis.⁴ In considering this issue, it is important to note that the scientific literature on the fiber-cancer link developed steadily from the early 1970s, with no major developments in the mid 1980s. For instance, of the 44 studies reviewed in the 1988 Surgeon General's Report on nutrition, 9 were published in the years 1973–1975, 7 in the years 1976–1978, 12 in the years 1979–1981, 8 in the years 1981–1984, and 8 in the years 1985–1987. The information flowing to the public also shows no other reason for changes in the mid 1980s. For instance, articles listed under “diet,” “cancer,” and “nutrition” in the *Guide to Periodical Literature* showed no increase in information to the public in the mid 1980s, until the articles discussing the advertising claims began in late 1984. In July 1985 there was one event that could color the analysis; then-President Reagan was diagnosed as having colon cancer, creating a short burst of publicity about the disease. This event did not appear to have a substantial effect on the cereal market, but to the extent that it did, estimates here will overstate the role of advertising.⁵

Taken as a whole, this evidence suggests that the suspension of the ban against health claims was a substantial change in the cereal market and that it is a sufficiently isolated event for study. Examination of the years surrounding the removal of the health claims ban should allow a reliable identification of the effects of the general flow of fiber information on cereal consumption, as distinct from any incremental effect of the addition of producer health claims.

Data

Market Share and New Product Data

Annual market share and sales data for the years 1978–1987 for major brands of cereals are taken from reports by John Maxwell in *Advertising Age* (hereafter referred to as the Maxwell data). Data on the fiber content of these cereals was obtained from the U. S. Department of Agriculture's 1985 *Continuing Survey of Food Intakes by Individuals* (CSFII) for Women, Ages 19–50 [USDA 1985], supplemented by label data from 1988 for new products.⁶

The resulting data set for which there is both brand-level market share data and nutrition information, accounts for approximately 80 percent of sales in the cereal market in 1978 and rises to nearly 86 percent of sales in 1987.⁷ In addition, new product introductions for the years 1979–1987 were collected through a systematic search of *Advertising Age* and other trade press.

Consumer Knowledge Data

Consumer knowledge data is taken from the *Health and Diet Surveys*, a series of national telephone surveys directed by the Food and Drug Administration (FDA), in collaboration with the National Heart, Lung, and Blood Institute (NHLBI).⁸ These surveys, which were conducted in 1978, 1982, 1984, 1986, and 1988, deal with a variety of health and diet issues. Since the 1978 data were unavailable and the 1982 survey did not contain any questions dealing with the fiber-cancer issue, data from the last three surveys only will be analyzed. The number of survey responses is 4,007 in 1984, 4,004 in 1986, and 3,200 in 1988. The overall completion rate, computed as the number of completed interviews divided by the number of eligible households, was 56 percent for the 1984 survey, 67 percent for the 1986 survey, and 65 percent for the 1988 survey.⁹ The 1984 survey was conducted before health claims were used in cereal advertising or labeling; the 1986 survey was conducted more than one year into the health claim advertising period; and the 1988 survey was conducted approximately three years into the health claim period.

The primary measure of consumer knowledge of the relationship between fiber consumption and cancer (labeled **FIBCAN1**) is derived from the question, “Have

you heard about any things people eat or drink that might help *prevent* cancer?" Respondents who mentioned fiber, roughage, whole grains, cereals, or bran in up to four responses were coded as knowing the relationship. This question was asked of approximately one-fourth of the sample in 1984, 1986, and 1988.

A second measure of consumer knowledge of the fiber-cancer link (labeled **FIBCAN2**) is available in the 1986 and 1988 surveys. Individuals were asked "Another thing found in food is *fiber*. Have you heard about any health problems that might be related to how much or how little fiber people consume?" Respondents who answered "Yes" were then asked "What health problems might be related to not consuming *enough* fiber?" Those who responded cancer or cancer of the colon/intestines/bowel in up to four responses were coded as knowing the relationship. These questions were asked of approximately one fourth of the sample in 1986 and 1988; this subsample does not overlap with the FIBCAN1 subsample in either year. This second measure of knowledge is not available for 1984.

The *Health and Diet Surveys* also contain demographic information, including the respondent's age, sex, household income, education, the number of adults living in the household, and whether the individual smokes or exercises regularly.

Individual Cereal Consumption Data and Nutrition Data

Individual cereal consumption data is taken from the 1985 and 1986 *Continuing Survey of Food Intakes by Individuals* (CSFII) for women aged 19 to 50.¹⁰ The datasets provide detailed 24-hour food intake data for independent national samples of women in spring 1985 (prior to most of the health claim advertising)¹¹ and in spring 1986 (more than a year after the health claim advertising began). There were 1,502 women in the 1985 sample and 1,510 women in the 1986 sample. These datasets also contain a variety of demographic data on the women, as well as weights to correct for participation rates.¹² All nonregression analyses in this paper use weighted data, though the results are not sensitive to this correction.

The 1985 sample will be treated as the "before" sample, reflecting behavior prior to the introduction of health claims, and thus the cumulative effect of the government and general health information about fiber disseminated prior to early 1985. The 1986 sample will be used as the "after" sample, representing the world after approximately one year of health claim advertising in the cereal market.

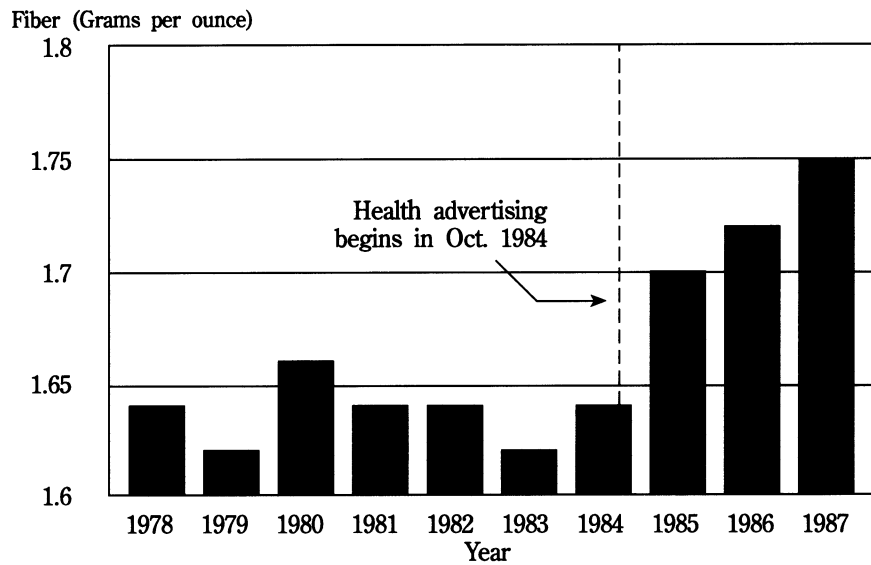
The CSFII data set also contains the nutritional value of 4,600 food items, including that for the branded and generic varieties of cereals.

Results and Analysis

Are Government and General Sources of Information Sufficient?

The benefit to consumers of permitting producers to use health claims in marketing depends, in part, on whether government and other general sources of diet-health information are sufficient to educate consumers. In the cereal case, this issue was first examined by analyzing changes in the consumption of fiber cereals. In particular, Figure 1 presents the average fiber content of cereals weighted by market shares in each year from 1978 to 1987. These sales data indicate that during the years 1978–1984, prior to the health claims period, there was no shift in consumption toward higher fiber cereals.¹³ Once producer health claims were added to the flow of information, a significant shift did occur. The weighted fiber content of cereals was 1.64 grams per ounce of cereal in both 1978 and 1984. It rose approximately 7 percent to 1.75 grams per ounce in the years 1985–1987, when health claims were allowed.¹⁴

As shown in Table 1, the FDA survey data show that consumer knowledge of the link between fiber and cancer (as measured by FIBCAN1) was low and did not

Figure 1. Average Fiber From Cereals

Averages are annual figures weighted by market shares as described in text.

increase substantially during the six years prior to the introduction of health claims. Only 4 percent of the sample reported knowledge of the fiber-cancer link in 1978,¹⁵ compared to 8.5 percent in 1984. After the introduction of health claims, knowledge increases were substantial; by 1986, 32 percent of the sample was reporting knowledge of this relationship. Reported knowledge fell to 27.7 percent in 1988, but remained well above 1984 levels.

Thus, both the market share data and the FDA knowledge data indicate that information about the relationship between fiber and cancer was not increasing substantially during the period when producers were prohibited from using health claims. Moreover, both data sources suggest that the addition of producer health claims caused significant increases in information in the market that had lasting effects for the three to four year period observable with available data.

Why Did Producer Advertising Have an Effect?

Perhaps the most important reason for advertising's significant effect on knowledge of the fiber-cancer link and on fiber cereal consumption is the substantial resources firms devoted to advertising the fiber-cancer link. One of the advantages of permitting producers to make health claims is the potential to tap the resources of the private sector in the effort to educate the public. If a firm has a high fiber cereal and knows that significant portions of the population do not understand the benefits of increased fiber consumption, it should often be willing to bear the considerable expense of communicating this message to consumers.

Beyond the basic issue of adding resources to the public information effort, there are a number of other reasons that producers might have impacts beyond those of government and other sources. For instance, the different methods used by producers to spread information may also be responsible for their relative effectiveness. Government and general information is usually disseminated in generic form ("increased fiber consumption may reduce some cancer risks"), and this information is usually concentrated in news and print media reports about the latest scientific studies on diet and health. These methods may be more effective in reaching educated and other informationally advantaged individuals, who use

Table 1. Percent Reporting Knowledge of Fiber-Cancer Relationship,¹ By Education**

	1978 ²	1984	1986	1988
Total	4 ³	8.5%	32.0%	27.7%
Education				
Not HS Graduate	1	1.1	18.0	15.0
HS Graduate	3	5.2	26.6	27.2
Some College	8	12.8	34.9	29.4
College Graduate		16.4	44.6	43.4

Data. FDA Health and Diet Surveys, 1978, 1984, 1986, and 1988.

Notes. ** indicates significance at a 95 percent level in chi-square tests of independence between the demographic characteristic and knowledge in each year.

¹Reported knowledge based on those who mentioned fiber, roughage, whole grains, cereals, or bran in up to four responses to the question, "Have you heard about any things people eat or drink that might help prevent cancer?"

²The 1978 statistics were taken from Levy and Heimbach [1990], who combined the "Some College" and "College Graduate" categories.

³Estimated from summary statistics in Baumgardner et al. [1980] and Levy and Heimbach [1990].

print media more than other groups and who may be better able to convert the generic information into specific purchase decisions.

By contrast, food advertising is more likely to appear on television than in the print media.¹⁶ Moreover, producer-provided health information is likely to be simplified and linked directly to product choices, making it easier to incorporate into behavior. Consequently, advertisers may be more effective than government sources in reaching the broad population. Additionally, advertisers have the incentives to identify subgroups of the population that do not have the health information and to design advertising campaigns directed specifically at these target groups. As a result, advertisers may be more successful in reaching culturally distinct groups or other groups who have disadvantages in acquiring and processing information.

Finally, in considering the effect of producer health claims, it is important to focus on manufacturers' incentives to improve the health dimensions of their products in a world in which they are free to communicate the value of these improvements, compared to a world in which they cannot highlight the health value of their products. *The Surgeon General's Report on Nutrition and Health* [1988] calls for food producers to introduce a greater variety of products that are lower in fat, sodium, and other undesirable characteristics, and higher in fiber, calcium, and other desirable characteristics. But from an economic perspective, producers have little incentive to bear the costs of developing more nutritious products that are attractive to consumers in taste, price, and other dimensions, unless they can profitably market such products. Because of their role in making it easier to get more healthful products to market, the use of health claims in advertising may be important in providing producer incentives for development and marketing of more healthful and attractive food products.

Next, some evidence is presented on the effects of producer and nonproducer information sources on various subgroups of the population.

Differences Across Groups When There Were No Health Claims

Table 1 presents reported knowledge of the fiber-cancer link by education group, using FIBCAN1. This evidence shows that in 1978 there were significant differences in knowledge about the fiber-cancer link across education groups. Only 1 percent of those without a high school education reported knowledge of the fiber-cancer link, compared to 8 percent of those with some college education. By 1984

there had been an increase in reported knowledge, but this increase was limited to the high education groups. For example, in 1984, as in 1978, only 1 percent of those with less than a high school education knew the link between fiber and cancer, whereas the percentage of the group with some college who knew the link rose from 8 percent to approximately 15 percent.

Table 2 reports knowledge levels across other demographic groups for 1984,¹⁷ again indicating significant knowledge differences across groups prior to the use of health claims. For example, 9.3 percent of whites reported knowledge of the fiber-cancer link in 1984, compared to only 4.6 percent of nonwhites. For nonsmokers, 9.9 percent reported knowledge of the link, compared to 5.6 percent of smokers. Differences in groupings based on education, income, race, and smoking are all significant in chi-square tests of independence, but differences based on the presence of two adults in the household or exercise choices are not significant.

Women consistently reported higher knowledge levels than men in 1984, and women exhibit larger differences across demographic groups compared to the entire sample. For instance, 19.7 percent of women who graduated from college reported knowledge of the fiber-cancer link, while none of those with less than a high school education reported this knowledge (compared to 16.4 percent and 1.1 percent, respectively, for the entire sample). Similarly, 15.3 percent of white women reported this knowledge compared to 8.8 percent of nonwhites (compared to 9.3 percent and 4.6 percent, respectively, for the entire sample). Differences

Table 2 Percent Reporting Knowledge of Fiber-Cancer Relationship¹

	1984		1986		1988	
	All Adults	Women 19-50	All Adults	Women 19-50	All Adults	Women 19-50
Total	8.5%	14.1%	32.0%	38.7%	27.8%	31.0%
Education						
Not HS Graduate	1.1	0.0	18.0	31.0	15.0	22.6
HS Graduate	5.2	9.0	26.6	31.5	27.2	22.8
Some College	12.8	22.6	34.9	37.8	29.4	30.4
College Graduate	16.4**	19.7**	44.6**	51.0**	43.4**	47.6**
Income						
\$0-15,000	3.0	6.2	26.0	27.7	21.0	22.2
\$15,000-35,000	11.5	16.0	34.8	44.6	21.9	23.6
Over \$35,000	13.8**	23.5**	40.2**	45.1**	40.2**	47.0**
Race						
White	9.3	15.3	34.6	41.9	29.2	32.7
Nonwhite	4.6*	8.8	18.1**	22.1**	21.8	19.2
Smoking						
Nonsmoker	9.9	15.8	33.8	40.7	27.9	30.0
Smoker	5.6**	10.0	26.1**	32.3	27.2	33.7
Male Head ²						
Single	8.9	15.4	27.1	34.3	28.0	36.0
Not Single	8.5	14.0	33.7*	39.6	27.8	30.1
N ³	997	362	1001	395	796	332

Data. FDA *Health and Diet Surveys*, 1984, 1986, and 1988.

Notes. ** indicates significance at a 95 percent level in a chi-square test of independence between the demographic characteristic and knowledge in the given year. * indicates significance at the 90 percent level.

¹Reported knowledge based on those who mentioned fiber, roughage, whole grains, cereals, or bran in up to four responses to the question "Have you heard about any things people eat or drink that might help prevent cancer?"

²This grouping reflects the number of adults in the household.

³Sample size does not reflect nonresponses on particular demographic characteristics.

based on the entire sample are statistically significant. However, despite the larger differences in knowledge rates for women, only education and income are significant in chi-square tests of independence in the women's sample. This lack of significance may be due to the smaller size of the women's sample.

These differences in 1984 knowledge levels across education and other demographic groups parallel fiber cereal consumption patterns found in the "before" sample of the CSFII food consumption data. For instance, Table 3 presents the proportion of women, 19–50 years old, who consumed cereals with at least two grams of fiber per ounce of cereal by various demographic classifications. A comparison of these fiber cereal consumption levels in early 1985 with the reported knowledge levels in 1984 shows a consistent pattern of differences across demographic groups. For example, only 1.9 percent of women with less than a high school education consumed high fiber cereals, compared to 8.2 percent of college graduates. Similarly, 6.7 percent of whites ate a high fiber, cereal compared to only 0.7 percent of nonwhites.

In summary, in the case of cereals, the available evidence on knowledge of the health issue and on consumption suggests that government and general sources of information appear to have an effect in reaching some subgroups of the population, but not all groups. Demonstrating that government and general sources of information have not been successful in reaching all segments of the public does not indicate that producer health claims will necessarily be more effective in reaching the broad population. In the next section, changes in knowledge of the fiber-cancer link and in fiber cereal consumption will be examined after the addition of producer advertising as an information source.

*Differences Across Groups
After Health Claims
Were Added*

As shown in Table 1 above, after the introduction of health claims, all education groups gained knowledge of the fiber-cancer link. For example, reported knowledge rose from 1.1 percent in 1984 to 18 percent in 1986 for those with less than a high school education. Knowledge for college graduates increased from 16.4 percent to 44.6 percent.

Table 2 presents reported knowledge of the fiber-cancer relationship by other demographic groupings in the post-health claims period. In 1986, all groups showed increased knowledge of the issue; there were still significant cross-sectional differences in knowledge; and women aged 19–50 years continued to have higher knowledge levels than the entire sample. For instance, 34.6 percent of whites reported this knowledge in 1986, compared to 9.3 percent in 1984; for nonwhites, the level in 1986 was 18.1 percent, compared to 4.6 percent in 1984. By 1988, reported knowledge fell somewhat overall, though it stayed well above 1984 levels. This knowledge measure suggests that the highest education group and the highest income group retained the information better than other groups.¹⁸

A comparison of reported knowledge by women in 1986 from Table 2 with the cereal consumption behavior in 1986, given in Table 3, reveals a similar pattern of cross-sectional differences in the two measures, with advantaged groups showing higher levels of both knowledge and consumption.¹⁹ However, the consumption data indicate that those groups that had relatively low levels of fiber cereal consumption in 1985 had the largest increases in high fiber cereal consumption by 1986. For example, the proportion of those who did not graduate from high school who ate fiber cereals increased from 1.9 percent to 4.8 percent. For college graduates, the increase was much smaller, from 8.2 percent to 8.6 percent. Similarly, the percentage of nonwhites eating fiber cereals rose from 0.7 percent to 4.4 percent, while whites increased from 6.7 percent to only 6.9 percent.

Thus, this evidence suggests that the use of producer advertising had a significant effect on both the knowledge of the fiber-cancer link and on consumption of fiber cereals. The gains in knowledge occurred for all demographic groups. All

Table 3 Percent Eating Fiber Cereals,¹ Women 19–50 Years

	1985	1986
Total	5.8%	6.5%
Education		
Not HS Graduate	1.9	4.8
HS Graduate	6.1	4.8
Some College	6.0	8.8
College Graduate	8.2**	8.6*
Income		
\$0–15,000	1.9	6.2
\$15,000–35,000	6.3	6.6
Over \$35,000	8.5**	7.1
Race		
White	6.7	6.9
Nonwhite	0.7**	4.4
Smoking		
Nonsmoker	7.2	7.1
Smoker	3.2**	5.4**
Male Head		
Single	3.1	4.6
Not single	6.6**	7.3*
N (Weighted)	1,502	1,510

Data. USDA *Continuing Survey of Food Intakes By Individuals, Women 19–50 Years*, 1985 and 1986.

Notes. ** indicates significance at the 95 percent level in a chi-square test of independence between the demographic characteristic and consumption of cereals with at least two grams of fiber per ounce. * indicates significance at the 90 percent level.

¹In this table, fiber cereals are defined as cereals containing at least two grams of fiber per ounce of cereal. The individual was coded as eating fiber cereal if he or she reported consumption of any quantity of a cereal of this type in the CSFII's in-person, 24-hour recall of all food consumed the previous day.

groups also showed increases in fiber cereal consumption when health claims were added, but these consumption increases were larger for informationally disadvantaged groups that were not well reached by government and other sources.

Additional evidence that knowledge of the health issue is responsible for the pattern of fiber cereal consumption is presented in Table 4. In the 1986 and 1988 FDA *Health and Diet Surveys*, individuals were asked to identify food sources of fiber with the question, "What foods are good sources of fiber?" In a variable labeled CEREALFIB respondents who mentioned bran cereals, grain cereals, high fiber cereals, bran, shredded wheat, or cereals in up to four responses were coded as knowing that cereals were a fiber source.

As shown in Table 4, knowledge of cereals as a fiber source was higher than knowledge of the fiber-cancer link in both years. More important, it showed smaller differences across groups and a less systematic pattern of differences across groups than either the fiber-cancer knowledge or the fiber cereal choices. Few of the differences across groups were statistically significant. For instance, 77.4 percent of those who did not graduate from high school knew cereals as a fiber source in 1986, compared to 78.4 percent of college graduates. In 1988, these knowledge levels were 84.6 percent for the lowest educational group and 79.9 percent for college graduates.²⁰

Thus, by 1986 all types of consumers had approximately equal, high levels of knowledge that cereals are a source of fiber. Yet, they did not equally translate

Table 4 Percent Reporting Knowledge of Cereals as a Fiber Source¹

	1986		1988	
	All Adults	Women 19–50	All Adults	Women 19–50
Education				
Not HS Grad.	77.4%	67.7%	84.6%	84.0%
HS Grad.	78.9	79.7	78.5	84.4
Some College	79.1	76.9	80.7	79.3
College Grad.	78.4	74.7	79.9	80.3
Income				
\$0–15,000	76.4	68.0	81.1	84.8
\$15,000–35,000	78.2	77.0	82.8	89.2
Over \$35,000	79.1	78.4	76.1*	72.8*
Race				
White	79.7	77.3	81.7	83.5
Nonwhite	72.0*	68.9	69.9*	70.4
Smoking				
Nonsmoker	79.4	73.6	80.4	86.8
Smoker	77.5	78.0	81.0	80.1
Male Head				
Single	76.3	70.0	82.3	90.7
Not single	79.2	77.9	79.7	80.2
N	882	349	737	280

Data. FDA Health and Diet Surveys, 1986 and 1988.

Notes. ** indicates significance at the 95 percent level in a chi-square test of independence between the demographic characteristic and knowledge of cereals as a fiber source. * indicates significance at the 90 percent level.

¹These results are based on the variable CEREALFIB, which reflects cereal responses to a question about which foods are good sources of fiber, as defined in the text.

this knowledge into consumption of fiber cereals. Groups that also had higher levels of knowledge of the fiber-cancer link disproportionately consumed fiber cereals. Together, this evidence supports the view that *both* knowledge of the health issue and knowledge of food characteristics are necessary for changes in consumer behavior.

*Effects of Health Claims on
Producer Incentives: New
Products and Market
Movements on Other Health
Dimensions*

Allowing cereal producers to use health claims about the fiber-cancer link has a direct effect on the market by providing this information to consumers who did not have it from other sources. However, health claims may also have other effects on the market through their role in shaping producer incentives and in influencing competition in the market. Evidence is presented on two of these market-level issues: the effect of health claims on the development of new products and the ability of competition to prevent claims on one health dimension from causing consumers to ignore other nutritional characteristics of the product.

New Products Before and After Health Claims New bran and whole wheat cereal products were introduced throughout the years 1978–1987. However, the number and proportion of new fiber cereals increased markedly during the health claims period.²¹ As shown in Table 5, cereals introduced between 1985 and 1987 were significantly higher in fiber than new cereals introduced between 1979 and 1984, when health claims were banned; the 1985–1987 products averaged 2.59 grams of fiber per ounce, compared to 1.70 grams per ounce for new products in

the earlier period. New products introduced during the health claim period were also significantly higher in fiber than the average cereal on the market in 1984, averaging 2.59 grams of fiber per ounce, compared to 1.56 grams per ounce for the average 1984 cereal.

Thus, the evidence on new product developments suggests that health claims are a significant factor in stimulating the development and successful introduction of more nutritious products in the market.

Other Health Dimensions of Cereals The ability to use health claims enhances producer incentives to highlight the positive nutritional aspects of food products. With health claims, consumers can be told not only desirable product features, but why the features are important. However, the ability to make health claims does little to generate disclosure from the firm about the undesirable features of its products. In isolation, this would appear to produce significantly biased information in the market.

However, from an economic perspective, this implication is not valid, once competitive reactions to health claims are taken into account. Health claims give all firms the ability to highlight their products' desirable health features more effectively. But desirable health features are defined *relative* to other competing products that the consumer could choose in the market. Thus, firms with products that have less of an undesirable feature than competing products have the incentive to highlight that fact. For instance, if a cereal producer focuses on the fiber-cancer advantages of its high fiber, high sodium product, a competitor that has a high fiber, but low sodium product has a strong incentive to inform consumers of the *relative* attractiveness of its product. Because health claims make it easier for competitors to fill in missing information, economic theory predicts that the ability to make health claims on individual health dimensions should increase the competitive pressure on producers to improve all the major health dimensions of their products.

There is evidence from the cereal market that is relevant to this issue. First, as shown in Table 5, data is available on the sodium and fat content of new cereals introduced before and after the introduction of health claims in the market. Despite the fact that fiber was the primary focus of health claims in the cereal market in 1985–1987, new cereals introduced during this period were also better on both sodium and fat dimensions, compared with new products introduced before health claims were allowed. For example, cereals introduced during 1985–1987 contained 149 mg of sodium per ounce, compared to 169.6 mg per ounce in the 1978–1984 period. When children's cereals are excluded from the sample, the difference is even larger (142.7 mg/oz compared to 178.6 mg/oz) and is statistically significant. For fat, the differences are smaller, but follow the same pattern. Thus, the evidence on new products supports the view that allowing health claims on individual health dimensions of the product leads to improvements overall in the characteristics of new products, compared to a world where health claims are banned.

A review of advertising from the health claims years 1985–1987 showed numerous examples of this type of competition on other health dimensions among fiber cereal products. The early Kellogg advertising focuses exclusively on the fiber-cancer theme. However, competitors quickly entered with "high fiber, low sugar," "high fiber, low salt," and other similar claims, as predicted by economic theory.²²

Figures 2 and 3 illustrate the overall effect of these competitive forces on the sodium and fat consumption from higher fiber cereals (defined as containing at least two grams of fiber per ounce), compared to that for low fiber cereals, based on weighted averages using the Maxwell market share data. In Figure 2, it is clear that the sodium content of higher fiber cereals was lower than that for low fiber cereals. Moreover, the sodium content of higher fiber cereals was falling through-

Table 5 Nutritional Characteristics of New Cereals¹

	Fiber (Gms/oz)	Sodium (Mg/oz)	Fat (Gms/oz)	<i>n/N</i> ³
New Cereals 1985–1987	2.59	149.0	1.01	31/36
New Cereals 1979–1984	1.70*	169.6	1.12	19/41
Average Cereal 1984	1.56*	196.0**	0.79	49/57
Averages Excluding Children's Cereals²				
New Cereals 1985–1987	3.59	142.7	1.02	22/24
New Cereals 1979–1984	1.99**	178.6*	1.07	14/19
Average Cereal 1984	2.05**	209.8**	0.83	34/39

Notes. * indicates that the difference between the mean for new cereals introduced 1985–87 and the mean for the type of cereal at issue is significant at the 10 percent level. ** indicates significant differences at the five percent level.

¹Simple averages (unweighted by market share) are given in the table and thus represent the characteristics of the average new cereal and not the nutrition received by the average consumer of new cereals. A listing of new products introduced between 1978 and 1987 is provided in Ippolito and Mathios [1989] and [1990].

²These averages exclude brands characterized as “children’s” cereals by the trade press.

³Indicates the number of brands *n* of the total *N* for which nutrition data are available. The excluded cereals presumably did not survive to 1985 or 1988, the years of the nutrition data.

out the period, and this reduction was enhanced during the health claims period. Similarly, the fat content of higher fiber cereals fell throughout the period, including the health claims period. Higher fiber cereals were higher in fat than low fiber cereals throughout the period, but the difference between the two continued to fall, so that by 1987 there was only a 0.1 gram difference between them. Thus, the evidence on sodium and fat in cereals indicates that the addition of health claims about fiber did not lead consumers to neglect other health-related aspects of cereal consumption.

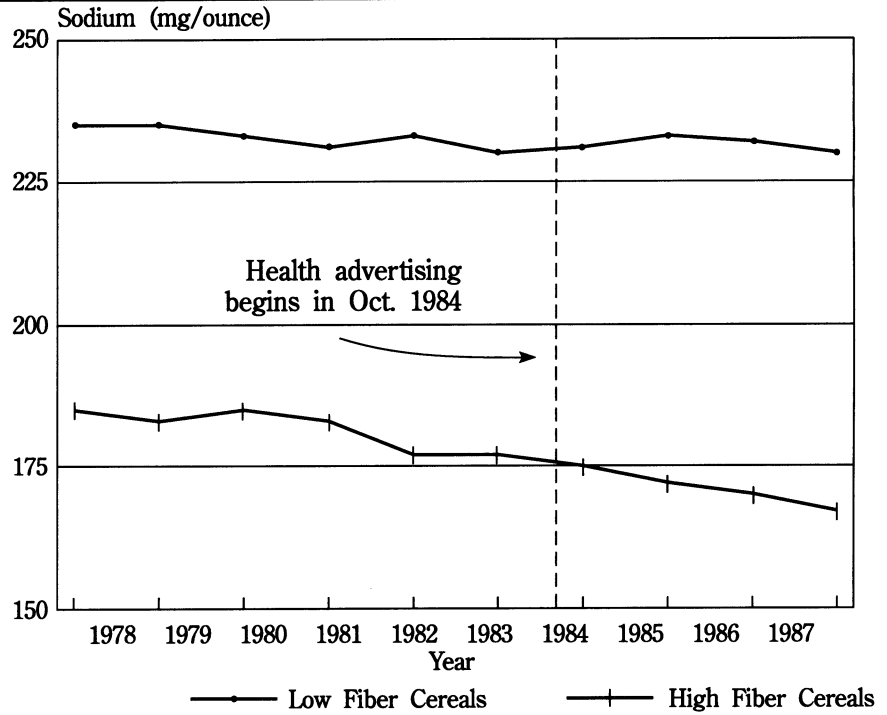
Issues for Future Research

This examination of market share data, individual consumption data, and consumer knowledge data indicates that health claim advertising for cereals was a substantial source of information for consumers. Moreover, allowing producers to use health claims resulted in more healthful product innovations and provided producers with the incentives to compete on multiple health dimensions of cereals.

While these results from the cereal market have been instructive in helping to focus more clearly on key issues in the health claims policy debate, additional work in the area is clearly needed to determine the extent to which results in the cereal market are typical of market behavior in other consumer product markets. In particular, it would also be useful to identify the importance, if any, of market structure (the cereal market is dominated by a few large producers), complexity of the scientific information to be communicated, credibility of the claim (producers in the cereal market were able to cite the National Cancer Institute), the underlying level of consumer understanding of the health issue (fiber was not a new concept for consumers), and other characteristics of the claim or the market that might influence the use and effects of producer health claims.

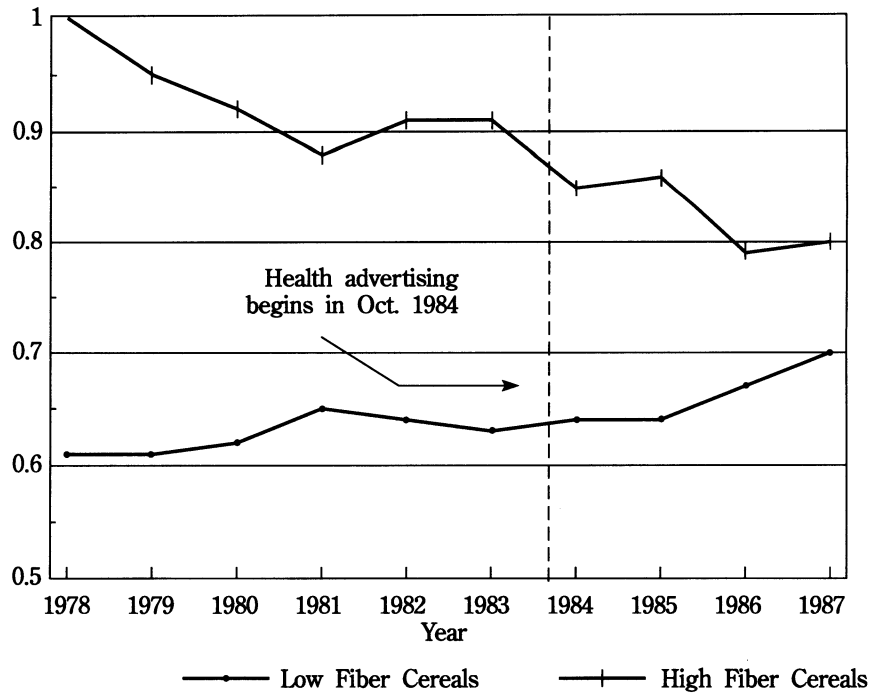
One of the major difficulties in conducting studies of this type, however, is the unavailability of detailed data on behavior. The range of data available in the cereal market is not typical of data usually available to researchers interested in con-

Figure 2. Average Sodium of Higher Fiber Cereals Compared to Low Fiber Cereals



Averages are weighted as described in text

Figure 3. Average Fat of Higher Fiber Cereals Compared to Low Fiber Cereals



Averages are weighted as described in text.

sumer product markets. Brand-level market share data is often very difficult to acquire for public use. Individual consumption data by brand and systematic new product data are also unavailable in most cases.

Since consumer knowledge data is often available, one approach to studying the issues is to focus exclusively on changes in consumer knowledge. Because both behavioral and knowledge data were available in the cereal case, this case creates the opportunity to test directly whether the results obtained from the consumer knowledge data would have given the same results as those drawn from sales and reported consumption data in this case.

Analysis of this issue indicates that at an aggregate level, using group data, the two measures of consumer knowledge of the fiber-cancer issue (FIBCAN1 and FIBCAN2) match fiber cereal consumption data quite well. All three measures indicate that there were systematic differences across demographic groups, with advantaged groups showing higher levels of knowledge and consumption and that health claims added significant amounts of information to the market. However, multivariate analyses of the role of individual characteristics in determining fiber cereal consumption and knowledge of the fiber-cancer issue give a more tenuous picture of the reliability of using only knowledge data to reach conclusions.²³ The two measures of knowledge available in the FDA data do not give consistent results in the years for which both are available, and only one of these knowledge measures (FIBCAN2) matches the cereal consumption data very well. Thus, at this finer level of analysis, there is some reason to be concerned about proceeding solely on reported knowledge data. Moreover, these results suggest the importance of the probative techniques in such surveys, as in the split-sample design of the FDA surveys, in which key issues are examined in several ways for subsamples of the population. The basis for these differences is unclear.

Implications for Policy

All of the evidence in the cereal market indicates that the introduction of health claims had a significant and beneficial effect in this market. Without health claims, fewer consumers would know about the link between fiber and cancer, fewer consumers would be eating fiber cereals, and there would be fewer fiber cereals on the market. To the extent that these results represent general phenomena, they have a number of implications for the debate about how best to regulate health claims.

The most important implication derives from the beneficial impact of producer claims in this case. The evidence here suggests that truthful producer claims have significant potential to increase consumer awareness of diet-health issues and to improve consumer dietary choices, especially for groups not well reached by government and other sources of information. For these reasons, health claims policy should be designed to ensure that producers' incentives to make truthful health claims in advertising and labeling are preserved.

While this implication may seem unexceptional, it is often lost in the debate about health claims policy, where a policy's ability to control deception often becomes the major focus of debate. All policies to control deceptive and misleading claims will also have an effect of discouraging some truthful claims. However, in considering alternative approaches to health claims policy, it is important to recognize that the magnitude of this effect on truthful information is as important to consumer welfare as the effects of deception. The cereal experience should remind us that consumers can be harmed by the information they do not have as easily as they can be harmed by the misinformation they have. If nothing else, the evidence from the cereal market indicates that health claim policy should be judged on two distinct criteria: (1) how well the policy encourages producers to disseminate health information creatively and effectively to all segments of the

population, and (2) how well the policy discourages deceptive or misleading claims.

To illustrate this point, consider some of the recent proposals for regulating health claims. One proposal would restrict health claims to government-specified language. Others would require claims to be pre-approved by regulators or to be restricted to pre-approved topics identified by government advisory committees. Still others suggest that claims should trigger extensive disclosure requirements. While all of these policies may be effective in limiting deception, they do so at a potentially significant cost of truthful information for consumers. Standardized and unchanging language will be more effective for some consumers than others and will lose its effectiveness over time. Yet, there is little discussion of whether this loss of effective communication is a necessary cost of controlling deception. Similarly, pre-approval of claims is likely to cause delay or to foster uniformity and routinization, as firms attempt to placate government reviewers. Extensive disclosure requirements raise the cost of making health claims, and hence, discourage such claims. Pre-approval of topics raises a substantial risk that many truthful claims will be prevented for some time, while the government approval process for new topics runs its course.

These approaches all share the characteristic that they impose their costs equally on truthful claims and deceptive claims. As a result, they make it less likely that firms will find it profitable to compete in health dimensions, compared to regulatory approaches that focus more narrowly on claims that are most likely to be deceptive or misleading. The important question for consumer welfare is whether these policies provide sufficient incremental benefit in stopping deceptive claims to outweigh the loss of truthful information that would accompany them.

A second implication of the cereal market evidence concerns the issue of incomplete information. In particular, the cereal evidence indicates that allowing firms to focus on individual health issues does not lead consumers to ignore other health dimensions of consumption. Competition in the cereal market, together with triggered nutritional labeling, apparently was sufficient to prevent deterioration of the progress underway on other nutritional dimensions of cereal consumption.

This issue is important in considering recent proposals that would restrict the use of health claims to products that are "good foods" overall, that is, to foods that meet desirable levels on all major health dimensions.²⁴ For instance, under such proposals, a producer of a high fiber cereal would be prohibited from making a cancer-prevention claims, unless the product was also low in sodium, fat, and cholesterol.

While it is easy to understand the stimulus for such proposals, it is important to recognize that these policies will prevent many truthful health claims of value to consumers. All consumers are not equally concerned about the same diseases. Individuals with a family history of hypertension may be justifiably more concerned with reducing the risk of this disease than the risk of cancer. Women with certain risk characteristics for osteoporosis may find it worth increasing calcium consumption, even with products that contain nontrivial amounts of fat. Regulations that require foods to be healthful on a full set of dimensions would prohibit many firms from communicating to consumers that their products can be desirable substitutions in some consumers' diets. Moreover, the evidence from the cereal market suggests that if there are products that are better on all health dimensions and attractive to consumers in price, taste, and other dimensions, incentives to reveal this fact are sufficiently strong to move the market toward overall improvement.

In conclusion, the evidence from the cereal market indicates that regulation of health claims should be judged not only by its ability to control deception, but also by its effect on the flow of truthful information in the market. Many of the policies that have been proposed to regulate such claims focus almost exclusively on con-

trolling deception, without recognizing the often subtle, but costly effects they will have in discouraging firms from competing on the healthfulness of food products. Good policy choices require a clearer recognition of this basic issue.

Notes

1. Some of the results reported here were previously published in Ippolito and Mathios [1990a]. This work was supported by the Federal Trade Commission, and earlier results were released to the public in Ippolito and Mathios [1989].
2. Of the 24 correlation studies on the topic reviewed in the recent *Surgeon General's Report on Nutrition and Health* [U.S. Surgeon General 1988], 21 indicate that an increase in dietary fiber consumption is related to a decrease in colon cancer. Also see Block and Lanza [1987] and Greenwald et al. [1987].
3. See Hutt [1986] for a detailed discussion of FDA's policy toward health claims for food products.
4. It should be noted, however, that only independent events would be problems for such analyses. For instance, in this case, there is evidence suggesting that the amount of advertising increased, once the health claim ban was lifted. However, since cereal producers were free to increase the amount of advertising prior to the regulatory change, it is reasonable to presume that this increase was a result of the regulatory change and, thus, properly attributed to the change. Of course, the possibility cannot be ruled out that producers changed their advertising behavior for some unknown, but exogenous change in market conditions.
5. In attempting to consider the role of the Reagan cancer news, examples of the major news stories at the time were collected. These indicated that there was no focus, and in most cases no mention, of preventative actions, such as increasing fiber consumption. As an additional check, bread consumption was also examined using the USDA data described below. If the Reagan news or other general information was responsible for the increased fiber cereal consumption, that information would also be expected to affect other potential sources of fiber in the diet, such as whole wheat bread. The same type of shift in consumption was not found for bread.
6. A limitation in using the USDA nutrition data is that it is from 1985. Therefore, within-brand changes in nutritional composition are not reflected in the data. Brands that were dropped from the market prior to 1985 are not likely to be included in the USDA data. Brands added after 1985 are also not in the USDA data. If the brand survived to 1988, label nutrition data from Spring 1988 was used to supplement the USDA data in these cases.
7. There are two types of cereals systematically excluded from this data, generics or "house brands" and new cereals that did not survive to 1985. Examination of these issues do not indicate that these exclusions bias the analysis. The "house brands" tend to be copies of the best selling brands (cornflakes, toasted oats, etc.) and, thus, are likely to reflect the market. The systematic exclusion of the short-lived new brands has more potential to bias the results, because these brands are predominantly children's cereals, which tend to be low fiber cereals. To test the sensitivity of the results to this selection problem, the analysis was repeated, excluding children's cereals. The average fiber content of cereals rose in both periods, as expected, but the results were otherwise unchanged.
8. See Levy and Stephenson [1990] or Schucker et al. [1987] for more detailed descriptions of the surveys.
9. This survey was conducted during the December holiday season in 1983 and into early 1984, possibly accounting for the lower response rate.
10. For a detailed description of the survey design, interview instructions, etc., see the CSFII documentation [USDA 1985 and 1986]. The data does not include information on consumption by men.
11. At this time only the early Kellogg fiber/cancer advertisements had been aired. If the advertising had an effect before the spring of 1985, the study will underestimate the advertising effects and overestimate the effects of the government/general health information.
12. Households were sampled to be representative of the population, and several attempts were made to collect food consumption data from all eligible women in the household. However, some households did not participate, and some women within participating households were not interviewed. Weights were computed to correct for response rate differences in each of the cells of the sample design at the household level and to adjust for individuals in participating households who did not provide consumption data.
13. There is some evidence in the trade press indicating that fiber cereals increased their market share during the mid 1970s, prior to the period covered by the data. [See, for instance, *Advertising Age*, March 29, 1976, and November 27, 1978].

14. Levy and Stokes [1987] also found substantial effects of health claims on cereals sales based on an examination of weekly sales data from a Washington D.C. grocery chain for a 48 week period that began 14 weeks prior to the Kellogg campaign. The size, distribution, and timing of the sales increases for the Kellogg fiber cereals relative to other firms' cereals supported the conclusion that the introduction of fiber-cancer advertising into the cereal market had a clear and substantial effect in shifting consumer purchases toward high fiber cereals.
15. Estimated from summary statistics in Baumgardner et al. [1980] and Levy and Heimbach [1990].
16. For instance, in 1986 nearly 99.1 percent of measured Kellogg advertising expenditures were for network, spot, or cable television [*Advertising Age*, September 24, 1987, p. 123].
17. Knowledge of the link between fiber and cancer by other demographic groupings was not reported for 1978 in Levy and Heimbach [1990].
18. Analysis of the alternative measure of fiber-cancer knowledge (FIBCAN2) generally supports these findings, though all groups showed somewhat lower levels of knowledge in this measure in 1988.
19. One discrepancy worth noting is the large gains in reported knowledge between 1984 and 1986 for the most advantaged groups, such as the highest income and education groups, but the small or nonexistent increases in fiber cereal consumption for these groups.
20. In Probit regression estimates, only one variable (middle income in 1988) was significant in explaining knowledge of cereal as a fiber source, in stark contrast to similar regressions for fiber cereal consumption, where several of the information and health related variables were significantly associated with consumption.
21. See Ippolito and Mathios [1989] or [1990a] for a list of new cereals introduced between 1978 and 1987.
22. For examples, see the print advertisement for Nabisco Shredded Wheat 'N Bran, *Reader's Digest*, June 1986, the print advertisement for General Mills' Fiber One, *Reader's Digest*, August 1985, and other examples in Appendix B in Ippolito and Mathios [1989].
23. See Ippolito and Mathios [1990c] for a more detailed analysis comparing the fiber-cancer knowledge data with the fiber cereal consumption data.
24. For instance, see Center for Science in the Public Interest [1989] or the recent House and Senate bills on labeling [H.R. 3562 and S. 1425, respectively].

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