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An Evaluation of Government and Industry Proposed
Restrictions on Television Advertising of Breakfast Cereals to Children

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Abstract In the United States, both industry and the federal government have worked to establish voluntary guidelines for how firms market food to children and to establish a threshold for the nutritional quality of foods marketed to children. The authors evaluate three US guidelines that deal with television advertising of breakfast cereals, which is both heavily advertised and a common meal item for children. They find that the majority of cereals advertised primarily to children from 2006-2008 do not meet any of the current and proposed self-regulatory nutrition guidelines, and that this is generally due to excessive sugar content. Further, children and adolescents are exposed to more advertising for products that do not meet the nutritional guidelines. We evaluate the extent to which each of the guidelines impacts advertising of cereals that are most viewed by children and purchased by households with children. The results provide insight for policy makers concerned with limiting the extent to which children see television advertising and ultimately consume unhealthy breakfast cereals.

Keywords nutrition guidelines, television advertising, voluntary restrictions

Introduction

Given the current global obesity crisis, marketing practices of food companies have received significant scrutiny. Advertising to children is viewed as particularly harmful, as children are more susceptible to the effects of advertising (Friestad and Wright 2005; Oates et al. 2003) and less capable of understanding the persuasive nature of advertising (Oates et al. 2001). Further, children are seeing disproportionately more food advertisements than adults. Where adults view 13.7 percent of television advertisements for food products, children view 21.6 percent of television advertisements for food (Holt et al. 2007). Two reports commissioned by the World Health Organization (WHO) in 2006 and 2009 (Hastings et al. 2006; Cairns 2009) and a report by the Institute of Medicine (IOM) (2006) survey scientific research on the extent, nature and effects of food promotion to children. They find that foods promoted to children influence their attitudes, nutrition knowledge, preferences, food purchase requests, and consumption. These studies conclude that the majority of foods marketed to children are high in calories, sugar, salt, fat and low in nutrients. Furthermore, they conclude that the influence of television advertising is associated with increasing risk of obesity among children.

Based on the scientific evidence surveyed by Hastings et al. (2006), Cairns, et al. (2009) and IOM (2006), a variety of governmental regulatory policies and self-regulatory initiatives have been developed worldwide in an effort to address concerns over the harmful and persuasive nature of advertising towards children and their effects on nutritional intake¹. Two of the most recent initiatives in the United States are the Children's Food and Beverage Advertising Initiative (CFBAI), which is an industry lead effort, and the Interagency Working Group on Food Marketed to Children (Working Group), which is a government lead effort. In general, both of these initiatives provide specific nutritional guidelines for products that can be advertised to children.

¹ Hawkes and Lobstein (2011) provide an extensive survey of worldwide regulatory activities on the promotion of food to children.

As we are writing this paper, many of the major food and beverage companies have implemented their specific pledges to the CFBAI regarding the nutritional standards of the foods they market to children. Going forward, it is likely that some combined version of the CFBAI and the Working Group guidelines will be in place and will shape the future landscape of food marketing to children. Therefore, a timely evaluation is necessary to understand how these self-regulatory efforts will affect advertising directed to children.

To this purpose, we evaluate how the CFBAI and Working Group guidelines can impact the nutritional quality, television advertising and household purchases of a product that is both heavily advertised and a common meal item for children and adults: breakfast cereals. In fact, in 2006 breakfast cereal manufacturers spent 97 percent of a total \$237 million in advertising to children ages 2-11 (FTC, 2008). Furthermore, the majority of cereals marketed to children contain more calories, sugar, and sodium and less fiber and protein than non-children's cereals (Schwartz et al. 2008). Finally, the leading companies in the cereal industry---Kellogg's, General Mills, Post and Quaker (under its parent company Pepsi)—have participated in the CFBAI since 2006. As such, breakfast cereals are particularly relevant to the discussion regarding the efficacy of the different self-regulatory guidelines.

Using several data sources, we determine the nutritional quality of breakfast cereals that are advertised on television. We identify which breakfast cereals may be restricted from advertising to child-dominated audiences based on CFBAI guidelines and the Working Group guidelines. We then use Nielsen Media Research advertising exposure data from 2006-2008 to estimate the extent to which advertisements for these products are viewed by children. Specifically, we compare the advertising of breakfast cereals that would and would not meet the nutritional standards of the voluntary guidelines using product level Gross Ratings Points (GRPs). GRPs measure the percentage of a particular audience that is reached by an advertisement times the frequency that audience sees the advertisement. Finally, we use Nielsen Homescan data to evaluate the extent to which households purchase breakfast cereals that fail to meet the different nutritional guidelines.

Results from our analysis reveal the extent to which products that have been advertised prior to the implementation/recommendation of the CFBAI and Working Group guidelines would be affected by these different regulatory actions. Our research adds to the existing literature by comparing the CFBAI and Working Group guidelines and evaluating the potential effects they might have on nutrition quality, television advertising to children and purchases by households with children; all with a focus on advertised breakfast cereals.

Background

In 2006, the CFBAI was implemented by the Council of Better Business Bureaus as a way to encourage firms to self-regulate their advertising to children. In general, participation involves restricting advertising directed at children and only advertising products that are “better” for children. Participation in the CFBAI is entirely voluntary and the definition of what constitutes marketing to children and “better” is established individually by each firm and applied only to that firm’s products (herein referred to as “firm specific CFBAI”). As of 2010, there are 17 companies, representing 75 percent of total food and beverage advertising to children (Better Business Bureau, 2010), that have joined the CFBAI. With a wide range of standards, however, there exists a varying level of participation.

The 2009 Omnibus Appropriations Act required the Federal Trade Commission (FTC), the Centers for Disease Control and Prevention (CDC), the Food and Drug Administration (FDA) and the United States Department of Agriculture (USDA) to establish the Interagency Working Group on Food Marketed to Children (herein referred to as “Working Group”). The Working Group has sought to establish voluntary principles to guide how firms market food to children and to establish a threshold for the nutritional quality of foods marketed to children. The nutritional guidelines proposed in 2011 by the Working Group (Interagency Working Group, 2011), with a recommended implementation timeline by 2016, would apply to all firms participating in a self-regulatory environment. The food and beverage industry strongly lobbied against the Working Group guidelines, calling them “unrealistic and unworkable” (Better Business Bureau, 2011), and responded with a proposed set of uniform nutritional guidelines for

all CFBAI participating firms (herein referred to as “uniform CFBAI”). The uniform CFBAI guidelines are scheduled to be implemented by the end of 2013. Facing resistance from the industry, the Working Group began revising its proposal and anticipated that the revised proposal would “share much in common with the new CFBAI nutritional standards” (Vladeck 2011). Subsequently, Congress added language to the fiscal year 2012 appropriation requiring a cost-benefit analysis of the guidelines prior to completing the draft Working Group report.²

Relevant Literature

While the CFBAI and Working Group address nearly all packaged goods marketed to children, this analysis focuses on ready-to-eat (RTE) breakfast cereals. Breakfast cereals are a common and popular choice for breakfast among children and adults. They are also a contentious product as many are high in sugar. Excessive added sugar can lead to various health problems including tooth decay, poor nutrition, overweight and obesity, and increasing heart disease risks. The 2010 Dietary Guidelines for Americans thus recommend limiting food intake with added sugar. In addition, Harris et al. (2010) find that offering children high-sugar cereals leads to them consuming both more total grams and more grams of sugar than children who are offered low-sugar cereal. Such compounded effects can have severe consequences.

At the same time, research in the nutrition literature suggests that even sugar-sweetened cereals are beneficial to healthful diets as they also provide important shortfall micronutrients that are often lacking in typical diets such as calcium, magnesium and potassium as well as a long list of other nutrients (Nicklas et al. 2004, Morgan et al. 1981, Frary et al. 2004). Furthermore, breakfast cereal consumption has been shown to be an important contributor to both mental and physical health (Smith 1999), including encouraging the complementary consumption of milk, which itself has important health benefits³.

² H.R. 2055 Sec. 626. Consolidated Appropriations Act, 2012.

³ The authors note that research published by Nicklas et al. (2004) and Smith (1999) were at least partially supported by the Kellogg’s company. Additionally, research by Frary et

Breakfast cereals are also one of the most heavily advertised foods in the US (FTC 2008), generating some concern as most research to date finds that the majority of cereals advertised to children have poor nutritional quality (Harris et al. 2009; Schwartz et al. 2008; Powell et al. 2007 and 2011). Harris et al. (2009) evaluate cereal nutrition quality, television advertising, as well as on-line and in-store marketing to children in 2008 through early 2009, a period prior to and immediately after the full implementation of firm specific CFBAI pledges by the leading cereal companies. They find that although the cereal companies have fully complied with their firm specific CFBAI pledges, the changes in amount of marketing directed to children or nutritional quality of cereals marketed to children were not “objectively and meaningfully” significant. Powell et al. (2011) examined the trends in nutritional qualities and television advertising of cereals as well as a number of other food categories in 2003, 2005, 2007 and 2009. Similarly, although there is some improvement in nutritional quality for cereals marketed to children between 2007 and 2009, still 94 percent of cereal advertisements seen by children feature products high in saturated fat, sugar or sodium. In their study, Wootan, et al. (2011) collects nutrition information of all 225 food products approved by firm specific CFBAI pledges between March and July 2011 and evaluate the nutritional quality of these products using the Working Group nutritional standards. They find that most of the firm specific CFBAI-approved cereals will not meet the Working Group sugar content standard without reformulation. The only evaluation of marketing that Wootan et al. (2011) do in their study is an identification of marketed brands based on CFBAI firm pledges.

In an extensive report, Harris et al. (2009) study cereal marketing to children and find that cereal products marketed to children via television advertising and internet media contained 85 percent more sugar than products marketed to adults. In a follow-up to their 2009 report, Harris et al. (2012) find that while some cereal firms have reduced advertising since 2009, advertising for other child-targeted cereals has increased during

al. (2004) was funded by the Northeast Dairy Foods Research Center. Thus it is not necessarily clear that added micronutrients are beneficial or outweigh the negative aspects of the macronutrients of concern.

this period. Children also continue to see more ads on television for cereal than any other food or beverage product, with a greater proportion of the advertising dollar spent on child brands.

In addition to the advertising of children's cereals, another relevant question to consider is the extent to which households with children purchase children's cereals. To this end, Castetbon et al. (2012) describe purchases of RTE cereals in the U.S. focusing on 2008 Homescan data. Among their findings they indicate that households with at least one child buy relatively more RTE cereals. They do not, however, identify if this relationship holds when looking only at advertised cereal products. We add to the literature by comparing how households with and without children purchase breakfast cereals that would not meet the nutritional standards of the three different self-regulatory guidelines.

Methods

To compare the three guidelines, we use several data sources to identify which cereals are advertised on television, the nutritional content of these cereals, and the consumption of these cereals by households.

Advertising Data

To identify breakfast cereals that are advertised on television we use Nielsen Media Research national advertising data from 2006-2008. For each of the breakfast cereals, we have weekly measures of total expenditures on advertising and GRPs disaggregated by age group. GRPs measure the percentage of a particular audience that is reached by an advertisement times the frequency that audience sees the advertisement, thus describing the extent to which an advertisement is seen by a particular audience. For example, 100 GRPs could be 1 percent of children seeing the same product advertisement 100 times or 100 percent of children seeing a particular product advertisement 1 time. Additionally, our GRP data are disaggregated by five age groups: ages 2-5, 6-11, 12-17, 18-24 and 25 and over.

We aggregate the weekly advertising data into yearly average expenditures and GRPs.⁴ We then group the cereal GRPs into categories based on whether or not the products meet the nutritional standards of each specific guideline. That is, we calculate the average GRPs for breakfast cereals that would and would not meet the nutritional guidelines of the firm specific CFBAI, uniform CFBAI, or Working Group. This reveals to what extent the various nutritional guidelines can potentially limit advertising of cereals that are viewed by the different age groups.

It is important to note that both the CFBAI and the Working Group restrict advertising that targets child-dominated audiences only, which are defined as having greater than a specified threshold percentage of its audience comprised of children under a specific age. The CFBAI has proposed a threshold that is at the discretion of the participating firms but can be no higher than 35 percent, whereas the Working Group has proposed a threshold percentage of 30 percent for children 2-11 and 20 percent for an audience share of children 12-17 (since the initial proposal the Working Group has retracted on their restriction to children age 12-17). Although our advertising exposure data do not contain information on the programs on which the advertisements are aired, the ratio of children's GRPs (age 2-11) to adult GRPs (age 18 +) allows us to infer whether children are the primary target of the advertising. This method was used by Harris, et al. (2009) and Schwartz et al. (2010) as a measure of identifying a marketing media strategy designed to target a specific age group. The authors argue that if the ratio is greater than 1, the firm has designed the advertising message to be directed toward children. We consider advertised products where the ratio is greater than 1.0 as being marketed toward children and refer to these as children's cereal products. Alternatively, we classify cereals that have a ratio below 1 as non-children's cereals. While this definition is not perfectly aligned with the current standard of evaluating child-dominated audiences, the two measures will be correlated. That is, advertising to child dominated audiences will have a higher ratio than advertising to adult audiences.

⁴ We also examine seasonality with the advertising data, and although we find some increases in summer advertising for products that do not meet the Working Group guidelines this is beyond the scope of our research question.

In addition to identifying children's cereals based on the ratio method, we are able to demonstrate the extent to which the three guidelines classify cereals that have a large number of advertising GRPs to children. We do this without consideration of whether the product is targeting child-dominated audience shares with its advertising. This is important because even when children are not directly targeted by advertising they are still exposed to advertising directed to adult or adolescent dominated audiences. Desrochers and Holt (2007) found that more than half of children's advertising exposure occurred during late afternoon and prime time. In addition, half of children advertising exposures are during programs where the audiences are less than 20 percent children. In the end, our analysis using GRPs reveals which of the three nutrition standards impact advertisements most viewed by children.

Breakfast Cereal Advertising

Due to the wide range of products offered by the major cereal manufacturers, advertisements may contain more than one product. At one extreme, advertising promotes only the firm (e.g. Kellogg's cereal); at the other extreme, advertising promotes only a single product (e.g. Honey Nut Cheerios). In addition, firms engage in a type of brand-group advertising, which includes numerous products under a similar brand. For example, General Mills advertises the Cheerios brand group which includes Honey Nut Cheerios, Multigrain Cheerios and Fruity Cheerios to name a few. While it is important to distinguish these different types of advertising that occur in practice, the CFBAI and Working Group have established standards for only evaluating product advertising⁵. These other forms of advertising, firm and brand group, are not restricted but do represent a significant amount of advertising dollars. They present a challenge to regulation, however, because the nutrition content of the products in the advertisement can vary widely to appeal to a greater audience, thus some of the products may meet the nutrition guidelines. Accordingly, we focus strictly on breakfast cereals with product level advertising.

⁵ It is important to note, however, that the Working Group did request comment on how to deal with firm level advertising.

Nutrition Data

We rely on several sources of data to evaluate the nutritional content of television advertised breakfast cereals. As our data spans a three year period (2006-2008) we are concerned with using nutrition information that is relevant for the exact data period. This is important because product reformulation may have occurred resulting in changes in the products nutritional content over time. By using year-specific data we control for reformulations that occur during this period.

Our primary source of nutritional information is Mintel's Global New Products Database (www.gnpd.com). Mintel has tracked products on grocery store shelves since 1996. This includes product reformulations, limited edition products and any new product introductions. When a new cereal is found on a grocery store shelf, Mintel records information about the product, including the nutritional content, and takes pictures of the product packaging. Using this database, we are able to identify the nutritional content of the majority of advertised cereals from 2006-2008, and update nutritional content as reformulation occurs.

In a small number of cases, Mintel does not have product information. Our second level of data comes from the USDA's Nutrient Database for Standard Reference, SR19, SR20, and SR21 (USDA 2006-2008). The Nutrient Database provides data on serving sizes and nutrient content for each product by year. A small number of cereals are not found in the Nutrient Database in which case we gather data using manufacturer websites. In these cases we do acknowledge that reformulation might have occurred during our data period that is not reflected in these data. We do not see this limitation as a significant restraint on our research.

Nutrition Guidelines

Despite the beneficial micronutrients obtained from the consumption of cereal, the CFBAI and the Working Group have each outlined explicit guidelines for evaluating the nutritional quality of breakfast cereals based on macronutrient criteria. Both groups evaluate cereal based on saturated fat, trans fat, sodium and sugar, but only the CFBAI

standards consider calories. None of the guidelines provide for exceptions based on positive fortifications that can enhance ones overall nutrition profile.

The top panel of Table 1 presents the CFBAI and Working Group nutrition guidelines. The Working Group evaluates breakfast cereals based on the nutrient content of specific Food and Drug Administration (FDA) guidelines for Reference Amounts Customarily Consumed Per Eating Occasion (RACC) as opposed to a labeled serving used by CFBAI. As can be seen, the Working Group provides stricter requirements for saturated fat, trans fat, sodium and sugar content, but does not restrict calories. For sugar, the Working Group standards concern added sugar (as opposed to naturally occurring sugar such as from added fruit), while CFBAI standards apply to total sugar. Cereals that are targeted towards children tend to be in the 30 gram RACC range, or correspondingly “lighter cereal” serving size for CFBAI standards. For this RACC or serving size, the cereals cannot exceed 10 grams of total sugar or 8 grams of added sugar to meet the uniform CFBAI or Working Group sugar standard respectively. The firm-specific CFBAI pledges (bottom panel) are relatively similar across companies, with Post being stricter with sugar and Quaker being stricter with sodium. Cereals can contain a maximum of 12 grams of total sugar or 11 grams of added sugar but still pass the sugar standards of General Mills, Kellogg’s or Post.

[INSERT TABLE 1 ABOUT HERE]

Household Purchases

We use Nielsen Homescan data to examine household breakfast cereal purchases patterns before the implementation of any voluntary or mandatory regulations regarding television advertising. The Nielsen Homescan data tracks the cereal purchases of a panel of 24,710 households from supermarkets, grocery stores, big box retailers, convenience stores, drugstores, and on-line. These households use a hand-held scanner to scan every cereal product each household member bought for at-home consumption, providing information on both the brand and the price paid. As breakfast cereal is largely purchased for at home consumption, this data set provides a fairly accurate reflection of total purchases of breakfast cereal for each household. The households in our data set live in one of sixteen metropolitan areas nationwide (Atlanta, Baltimore, Boston, Chicago, Detroit, Hartford,

Houston, Kansas City, Los Angeles, Miami, New York, Philadelphia, San Francisco, Seattle, Springfield, and Washington D.C.). For each household in the sample, we also have extensive demographic information. Importantly for this study, we know the number and age of children in each household.

Analysis and Findings

Table 2 provides a summary of the nutritional content of television advertised breakfast cereals. We calculate summary statistics for each RACC based on their classification of being a non-children's cereal or children's cereal. The 30 gram RACC is the most common children's cereal size and on average has more fat and sugar and less protein and sodium when compared to the average non-children's cereal of the same RACC. Of the cereals in the 50 gram RACC, all of them are classified as non-children's cereals. Most relevant to this research is that children's cereal has a higher amount of sugar per RACC, and the sugar content of a 30 gram RACC is comparable to a non-children's cereal in a 50 gram RACC. This is especially significant as the average serving size of children's cereals is much smaller. Essentially, the average children's cereal serving is over one third sugar.

[INSERT TABLE 2 ABOUT HERE]

From the 94 cereal products that were nationally advertised on television at some point from 2006-2008, we identify 54, 52, and 39 that advertised in 2006, 2007, and 2008, respectively (Table 3). Of these brands, we categorize cereals based on the previously discussed metric developed by Harris et al. (2009). In each year of our data (2006-2008), the number of advertised children's cereals is greater than the number of advertised non-children's cereals, indicating the continued emphasis on advertising cereals to children. It also appears that cereal advertising gradually declines for both children's and non-children's cereals. This could be due to a downturn in the US economy or other exogenous factors.

We identify by year, children's and non-children's breakfast cereals that would and would not meet the nutritional standards of the firm specific CFBAI, uniform CFBAI and Working Group. All manufacturers of advertised cereal from 2006-2008 participate in the CFBAI, thus there exists the potential for full voluntary restriction of all advertised

cereals. In each year, the number of children’s cereals that would not meet the nutritional standards is much larger than the number of non-children’s cereals, both in nominal terms and as a percentage. This clearly shows the extent to which children’s cereals are high in key macronutrients that need to be limited as part of a healthy lifestyle. We also note that in each year that the Working Group standards identify a greater number of advertised products that do not meet the nutritional standards than the uniform CFBAI standards, which identify a greater number of advertised products than the firm specific CFBAI standards, particularly for children’s cereals. This is largely because the Working Group tends to focus on the primary macronutrient of concern with children’s cereals: sugar content. We further break down the cereals by whether they would fail to meet the guidelines for sugar content only, sugar and another macronutrient, or some macronutrient besides sugar. The majority of cereals that would not meet the nutritional guidelines of the Working Group standards have excessive amounts of sugar alone or in combination with another macronutrient. While the other CFBAI standards also restrict cereals due to sugar content, the Working Group focuses on a larger share of high sugar cereals.

[INSERT TABLE 3 ABOUT HERE]

Comparing cereal GRPs

As previously discussed, the three nutritional guidelines identify advertising targeted to children based on the audience share of children. The products we identify that do not meet the nutritional guidelines (Table 3) would only be restricted on television programs that also fail to meet the various audience share standards. Some of these brands, however, may not have targeted children with their advertising from 2006-2008. As such, our estimate of restricted products represents an upper bound estimate of products that would be restricted from advertising to children under the various guidelines. We can, however, compare GRPs of cereals that would and would not meet the nutritional guidelines. This comparison can help describe the extent to which the different nutritional guidelines impact cereal advertisements that are viewed by children.

We separate breakfast cereal advertising GRPs into three age groups by year for both children’s and non-children’s cereals. We then calculate the average yearly GRPs of

brands that would and would not meet the nutritional guidelines for the firm specific CFBAI, uniform CFBAI and Working Group (Table 4A and 4B). We also calculate the total number of GRPs for all ages, the average yearly expenditures and the GRPs per dollar. This latter calculation provides a sense of how effective advertisers are in maximizing their GRP return per dollar of advertising expenditure. All of these measures give a sense of the firms advertising behavior of children's and non-children's cereals that fall under these different nutritional guidelines.

[INSERT TABLE 4A and 4B ABOUT HERE]

Looking at children's cereals (Table 4A) it is clear that breakfast cereal advertisements are viewed more by children age 2-11 than any other age group, for cereals that meet and fail to meet any of the nutritional guidelines. The opposite can be said about non-children's breakfast cereal advertisements (Table 4B), which have a larger share of GRPs with adults 18 and older. Another interesting comparison between children's and non-children's cereals is their GRPs per dollar. Specifically, non-children's cereals have a higher total expenditure on advertising yet obtain fewer total GRPs. This is true for cereals that meet and fail to meet the nutritional guidelines. The ratio of GRPs per dollar is generally over 1 for children's cereals and roughly 0.25 for non-children's cereals. This reveals the extent to which firms are more effective in obtaining GRPs for children's advertisements⁶.

Looking again at children's cereals, the products that fail to meet the firm specific CFBAI nutritional guidelines have a lower average number of GRPs than those that meet the guidelines for each year and age group. As this data precede implementation of the CFBAI for breakfast cereals, this is not due to implementations of the company pledges. This suggests that the firm specific CFBAI guidelines would not necessarily impact the cereals that were being heavily advertised to children. The opposite is true with non-children's cereals in 2006 and 2007, where the products that would fail to meet the nutritional guidelines have more total GRPs. In 2008 GRPs for non-children's cereals are

⁶ We make no claim on the effectiveness of these GRPs to result in purchase of the advertised product.

higher for those products that meet the standards, similar to the findings for children's cereals.

In terms of GRPs for children age 2-11, the uniform CFBAI standards appear to impact children's cereals that have a much greater number of average yearly GRPs. As such, the uniform CFBAI impacts cereals that are viewed more by children. With non-children's cereals, for 2006 we see more similarities in terms of the number of GRPs between the products that meet and fail to meet the nutritional standards of the uniform CFBAI. Alternatively, in 2007 and 2008, the GRPs are higher for those products that meet the standards.

Finally, the Working Group standards would be the strictest on children's breakfast cereals, so much so that in 2007 and 2008, there are no products advertised that would meet the nutritional standards of the Working Group. Interestingly, in 2006 the products that fail to meet the Working Group standards have slightly fewer GRPs for children age 2-11. With non-children's cereals, the GRPs for products that meet the Working Group nutritional standards in 2006 have fewer GRPs, yet in 2007 and 2008 have higher GRPs than those products that fail to meet the standards.

Overall, it appears that the Working Group and uniform CFBAI might be more effective than the firm specific CFBAI standards in impacting the advertising of children's cereal products that fail to meet the standards and that give the greatest advertising exposure to children.

Reformulation

A natural question regarding breakfast cereal products is to what extent manufacturers can improve the nutritional quality of their cereals through reformulation. That is, can firms reduce the sugar content of their cereals to meet the Working Group nutrition guidelines? Immediately after the CFBAI was put in place in 2006, General Mills reformulated 11 brands and introduced 10 new lower sugar brands, while Kellogg's reformulated 7 brands and introduced 12 brands with lower sugar (Clark and Crockett, 2008). One might expect a similar response if the Working Group guidelines are implemented.

To more specifically examine the idea that firms could reformulate their cereals to meet the various nutritional standards, we calculate the average excess sugar content for cereals that would not meet the three nutritional standards (Table 5). Interestingly, non-children's cereals have less sugar on average than the prescribed guidelines. This reflects what was shown in Table 3-- many non-children's cereals fail to meet the nutritional guidelines for some nutrient other than sugar. In terms of children's cereals, the opposite case occurs as they have more sugar on average than the various guidelines. At the same time, children's cereals would only have to reduce their sugar content by less than a gram to meet the firm specific CFBAI nutritional standards for sugar. While this is largely a function of the firm's more relaxed standards on sugar, it also demonstrates that firms may not have to excessively reformulate their cereals in order to advertise their brands under their CFBAI pledges. To meet the uniform CFBAI standards, firms would have to reduce their sugar content even more, but no more than 1.5 grams on average. Comparatively, the Working Group would require greater reductions in average sugar content, roughly 3 grams. This is likely to be one reason cereal manufacturers have been opposed to the Working Group guidelines and called them unworkable. They clearly require a more significant reformulation. At the same time, however, there has been pushback against the proposition of reformulation.

[INSERT TABLE 5 ABOUT HERE]

In fact, according to General Mills, they are near the "sweetness threshold" in terms of being able to reduce sugar in their children's cereals (Jargon 2011). That threshold appears to be dictated to some extent by sales, however, rather than technical limitations as General Mills indicates that "right around nine grams of sugar per serving, you're at the breaking point where the sugar level is so low that the sweetness is not enough for a kid to eat it on day two after trying it on day one" (Jargon, page B1). Clearly, some of this limitation is based on existing taste preferences of American consumers and more aggressive approaches that gradually change those preferences may be necessary to achieve the desired health impact. Of course one cannot expect a profit maximizing firm to take such an aggressive approach at the risk of decreased sales unless consumer demand or regulatory environments dictate such action.

Household Purchases

While the key focus of the CFBAI and Working Group standards is advertising, the motivation of these efforts is to help reduce consumption of unhealthful breakfast cereals, particularly by children. From the preceding analysis we have seen that the uniform CFBAI and Working Group nutritional guidelines would focus on cereal advertisements most viewed by children. A relevant question is whether children are eating these cereals that are primarily marketed to them. If the answer is yes, then implementing these stricter voluntary guidelines can potentially promote healthy diets of children. Otherwise, the costs of implementing the stricter standards might outweigh benefits. Although we do not have information on children's consumption, we examine household cereal purchases to lend insights to this question.

Table 6 shows the average annual cereal purchases for households with children under 12, under 18 and adults only. Purchases are further broken down into children's and non-children's cereals from 2006-2008. The table also shows the percentage of purchases that would fail to meet the nutritional standards of the three voluntary guidelines. The top panel provides a reference point: purchases of non-children's cereals by households with children under 12, under 18 and adults only. As can be seen, a negligible percent of the non-children's cereals that are purchased would fail to meet any of the nutritional guidelines.

In contrast, the purchases of children's cereals show a different picture. For all three household types, at least 46.3 percent of the purchases would fail to meet the firm specific CFBAI guidelines, about 98 percent would fail to meet the uniform CFBAI guidelines and roughly 100 percent of purchases would fail to meet the Working Group guidelines. Clearly the stricter uniform CFBAI and Working Group guidelines would impact advertising of cereals that are widely purchased by household with and without children, although the greatest share of these purchases occurs in households with children. In fact, the average number of ounces of children's cereal purchased is over 135 ounces per year for households with children whereas households with only adults purchase about 40 ounces per year. Although we can say nothing about the causal relationship of advertising and household purchases, these data suggest that voluntary advertising restrictions, especially the stricter uniform CFBAI and Working Group that

can potentially change the advertising landscape of cereals marketed to children can also impact purchases by households with children. Limiting the advertising of nutritionally inferior cereals could potentially improve the nutritional quality of cereals consumed by children and adolescents and ultimately aid in the development of healthier lifelong eating habits.

[INSERT TABLE 6 ABOUT HERE]

Discussion

This paper identifies breakfast cereals that were advertised on television from 2006-2008. Using these data, we evaluate the potential impacts of the three different nutritional guidelines for breakfast cereals (firm specific CFBAI, uniform CFBAI, and Working Group). Consistent with Harris et al. (2009), Wootan et al. (2011) and Powell et al. (2011), we find the firm specific CFBAI to have the weakest nutritional standards on cereals that were marketed primarily to children during 2006-2008. Therefore, it is not surprising that the full implementations of the firm specific CFBAI pledges by the cereal companies did not result in significant reduction in advertising exposure of non-healthy cereals to children and meaningful improvement in nutritional qualities of cereals advertised. On the other hand, the uniform CFBAI and Working Group have much stronger nutritional guidelines especially for sugar content, and they would impact most of the cereals primarily viewed by children during 2006-2008. For instance, of the 23 cereal product advertisements primarily viewed by children in 2008, only 12 of them fail to meet the nutritional standards of the firm specific CFBAI, whereas 18 of them will not meet those of the uniform CFBAI and none of them would meet the nutritional standards of the Working Group. Consequently, we would expect the implementations of either of these two guidelines to lead to more meaningful changes in the landscape of cereals marketed to children.

In terms of implementation, it is important to note that the Working Group has refocused its recommendations to apply only to the 2-11 age groups, rather than all children under 18 years of age, since its initial proposal to do so was criticized by the food and beverage industry. Whereas the uniform CFBAI is set to be implemented by the end of 2013, the Working Group standards would be implemented by 2016 assuming it is

justified by a recent Congressional mandate that requires the FTC to justify the guidelines based on a cost-benefit analysis. Given this mandate the future of the Working Group completing its work has been left in doubt with the FTC Commissioner Jon Leibowitz taking the position that completing the report is not a priority for the FTC (US House of Representative SubCommittee, 2012).

We also evaluate household purchases of cereals during our data period. Previous research has not linked cereal advertising to children and purchases of cereal products. Reduction in the consumption of high sugar cereals by children could be an alternative basis for regulation or self-regulation (Harris et al., 2009). Although we do not have information on within household consumption, we focus on the cereal purchases of households with children. Looking at purchases of children's cereals, we find that at least 46.3 percent of the products purchased would fail to meet the firm specific CFBAI guidelines, about 98 percent would fail to meet the uniform CFBAI guidelines and roughly 100 percent of purchases would fail to meet the Working Group guidelines. Interestingly, the purchase patterns of households with children under 18 are very similar to those with children under 12, suggesting that the adolescents are also eating the same types of cereals as children. Also, cereals whose advertisements are primarily viewed by children also account for about 20 percent of the total cereal purchases of households with adults only. This may be a function of habit formation from early childhood years that have developed taste preferences that continue in adolescence and adulthood. Therefore, a relatively strict voluntary nutritional standard such as those in uniform CFBAI or Working Group could potentially promote healthful diets for children, adolescents and even adults.

Our findings also reveal the extent children actually view television advertising for breakfast cereals. Rather than focus on how firms target different audiences, we measure the Gross Ratings Points for various cereal products, which measures how often a certain demographic group sees an advertisement. In general, children view far more advertisements for children's cereals. The Working Group is more effective at impacting advertising of children's cereals that have the largest number of GRPs.

Our analysis utilizes GRP data to evaluate the potential impacts of the three proposed self-regulatory efforts on cereal marketing to children. This constitutes a

limitation of our study because the GRP data do not contain information on advertising audience composition, on which the voluntary efforts based the restrictions. Descrocher and Holt (2007) importantly point out, however, that children receive half of their exposure to food advertising on children's programs. Therefore, an important future area of research is to evaluate whether restricting advertising exposure from programs with child dominated audiences only could effectively reduce children's exposure to advertising in terms of GRPs⁷; and subsequently, whether this impacts household purchases and consumption.

Restrictions based on target audience composition alone may not effectively restrict who actually views an advertisement and are unable to identify the extent that advertising is viewed by children. Recently, Adams et al. (2012) find that children are exposed to the same level of junk-food advertising despite the U.K mandatory ban on junk advertising based on children audience share, because children are also exposed to advertisements on general programming. The study has prompted a call by Scottish public health minister to completely ban all junk-food advertising aired after 9pm (BBC News 2012). Desrochers and Holt (2007) also found that children receive 28.7 percent of their ad exposure between 8pm and 12am and that programs that have a small share of children in their audience receive a large amount of children's ad exposure. Focusing on reducing the number of GRPs for cereals that fail to meet the nutritional guidelines, *in addition to* using the definition of child-dominated audiences may be a more effective policy approach than focusing on cereals with child-dominated audiences. Desrochers and Holt (2007) importantly point out the potential for such a policy approach could have issues with first amendment rights, however, thus further research on advertising on programs with child-dominated audiences is warranted.

Although we briefly discuss this issue in the paper, the potential for reformulation of products has not been discussed extensively in the literature. The Working Group has recognized that reformulation is a possibility and we have seen this response in the past with reformulations after the introduction of the CFBAI. Reformulation of products to make them more healthful would ultimately benefit the consumer as long as it does not

⁷ We thank an anonymous reviewer for bringing up this point.

spur a marginal increase in price greater than the marginal health gain from better nutritional quality.

Another area of research that would provide important insight is to examine firm behavior. Following a restriction on advertising, firms may choose to engage in other behavior to compensate. For example, firms may switch from product specific advertising to group or company name advertising, something we have identified here as a current advertising strategy. Alternatively, firms may reduce their prices or invest in other innovative marketing strategies. As noted by Desrochers and Holt (2007) in their study of children's exposure to advertising, if food advertising on television were restricted, where would food advertisements go? Alternative media such as internet advertisements are an important consideration.

Ultimately the motivation in the debate of advertising restrictions is to reverse growing trends of health problems and obesity. Thus it is important to also question whether such advertising bans have an impact on consumption or health related (obesity) outcomes. Several authors suggest that such advertising bans are trivial and will have no substantial effect. Zywicki, Holt and Ohlhausen (2004) find that food marketing to children has not grown during the same time that obesity has increased. Comparing food advertisements in 2004 and 1977, Desrochers and Holt (2007) find that children are not exposed to more food advertisements and they find no evidence that children are seeing more advertising for low nutrition foods over the same time period. Further, the authors caution about what type of advertising might fill the void of restricted food advertising. If advertising for sedentary pursuits (video games, screen/audio entertainment, etc) were to become more prominent, this could have negative effects on combating obesity. Andreyeva, Kelly and Harris (2011) find no association between food advertising and average body weight, although fast food advertising is associated with BMI for overweight and obese children. This does not necessarily mean advertising does not contribute to obesity, but rather that more research is needed to examine this relationship. In conclusion, food marketing to children is both pervasive and complex. As such, regulating television advertising to children is equally complex. This article considers what effect current self-regulatory efforts would have on breakfast cereal advertising, a common breakfast item for children. The implications of our analysis are applicable to

other food categories as well, and can help inform policy makers who are considering such self-regulatory efforts.

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Tables

Table 1. Nutritional Guidelines for Uniform CFBAI, Working Group and Firm Specific CFBAI.

Type ^b	Uniform CFBAI		Working Group ^a		
	Lighter Cereal	Denser Cereal	15 gram RACC	30 gram RACC	50 gram RACC
Calories	150	150-200	NA	NA	NA
Saturated fat (g)	1.5	2	0.3	0.6	1
Trans fat (g)	NA	NA	0	0 (<0.5)	0 (<0.5)
Sodium (mg)	290	360	210 ^c	210 ^c	210 ^c
Sugar (g)	10 (Total sugar)	12 (Total Sugar)	4 (added sugar)	8 (added sugar)	13 (added sugar)

a. Nutrition standards for the Working Group are shown here based on their RACC size category using the appropriate conversion stated in the proposed guidelines.

b. The Working Group categorizes breakfast cereals based on Reference Amounts Customarily Consumed Per Eating Occasion (RACC), which is based on the density or type of cereal. The smallest RACC is 15 grams for a cereal weighing less than 20 grams per cup. The next RACC size is 30 grams, which consists of cereals weighing 20 grams or more but less than 43 grams per cup. High fiber cereals containing 28 grams or more of fiber per 100 grams are also included in this RACC. The third RACC size is the 55 gram RACC. This RACC is for cereals weighing 43 grams or more per cup and biscuit type cereals.

Alternatively, the CFBAI categorizes cereals that are “lighter” and “denser”, with “lighter” corresponding to the two smaller RACC sizes and the “denser” roughly equivalent to the largest RACC.

c. The IWG sodium criterion is the interim target with suggested implementation by 2016. It is based on per serving. The ultimate sodium criterion, proposed to take place in 2021, is 140 mg per RACC.

Firm Specific CFBAI				
Manufacturer	GM	Kellogg's	Post	Quaker ^d
Calories	175	200	200	NA
Total fat (g)	3	NA	3	35 % of cal.
Saturated fat (g)	2	2	1	10% of cal.
Trans fat (g)	0	0	0	0 (<0.5)
Sodium (mg)	230	230	230	150
Sugar (g)	12 (Total sugar)	12 (Total Sugar)	11 (added sugar)	10% of cal.

d. Quaker is a subsidiary of PepsiCo Inc who has made the pledge to the CFBAI.

Table 2. Average nutritional quality and serving size of advertised cereals by cereal type and Reference Amount Customarily Consumed (RACC) (2006-2008)

	Non-children's cereals					
	15 gram RACC		30 gram RACC		50 gram RACC	
	(n=0)		(n=19)		(n=23)	
	mean	s.d.	mean	s.d.	mean	s.d.
Calories	NA	NA	114.4	11.4	196.0	48.5
Fat (g)	NA	NA	1.1	0.8	2.3	2.0
Saturated fat (g)	NA	NA	0.2	0.5	0.4	0.7
Sodium (mg)	NA	NA	189.9	54.7	177.9	104.9
Fiber (g)	NA	NA	1.4	1.0	5.4	3.0
Sugar (g)	NA	NA	7.8	3.5	12.7	4.7
Protein (g)	NA	NA	2.1	0.7	4.7	1.6
Serving size (g)	NA	NA	29.9	2.0	55.1	10.3

	Children's cereals					
	15 gram RACC		30 gram RACC		50 gram RACC	
	(n=1)		(n=51)		(n=0)	
	mean	s.d.	mean	s.d.	mean	s.d.
Calories	119.0	NA	116.5	13.5	NA	NA
Fat (g)	2.0	NA	1.5	1.0	NA	NA
Saturated fat (g)	0.0	NA	0.4	0.5	NA	NA
Sodium (mg)	175.0	NA	157.7	32.1	NA	NA
Fiber (g)	1.0	NA	1.3	0.7	NA	NA
Sugar (g)	12.0	NA	11.4	2.1	NA	NA
Protein (g)	2.0	NA	1.5	0.5	NA	NA
Serving size (g)	29.0	NA	29.8	1.7	NA	NA

Table 3. Cereals Advertised on Television that would Not Meet Different Nutritional Standards

	2006		2007		2008	
	<i>Non-children's cereals</i>	<i>Children's cereals</i>	<i>Non-children's cereals</i>	<i>Children's cereals</i>	<i>Non-children's cereals</i>	<i>Children's cereals</i>
Cereals Advertised on Television	20	34	19	33	16	23
Cereals Not Meeting the Nutritional Standards of:						
Firm Specific CFBAI	6	16	4	18	7	12
<i>due to sugar only</i>	0.0%	81.3%	0.0%	83.3%	0.0%	100.0%
<i>due to sugar and other nutrient(s)</i>	50.0%	0.0%	0.0%	5.6%	28.6%	0.0%
<i>due to other nutrient(s)</i>	50.0%	18.8%	100.0%	11.1%	71.4%	0.0%
Uniform CFBAI	8	26	6	26	7	18
<i>due to sugar only</i>	0.0%	46.2%	0.0%	57.7%	14.3%	66.7%
<i>due to sugar and other nutrient(s)</i>	37.5%	34.6%	0.0%	19.2%	14.3%	22.2%
<i>due to other nutrient(s)</i>	62.5%	19.2%	100.0%	23.1%	71.4%	11.1%
Working Group	13	32	8	33	8	23
<i>due to sugar only</i>	46.2%	59.4%	25.0%	63.6%	12.5%	47.8%
<i>due to sugar and other nutrient(s)</i>	23.1%	34.4%	25.0%	33.3%	25.0%	47.8%
<i>due to other nutrient(s)</i>	30.8%	6.3%	50.0%	3.0%	62.5%	4.3%

Table 4A. Average Annual GRPs of Brands that would Fail or Meet Different Nutritional Standards

<i>Children's Cereals</i>		Firm Specific CFBAI		Uniform CFBAI		Working Group	
Year	Group	Fail	Meet	Fail	Meet	Fail	Meet
2006	ages 2-11	3420.35	4354.6	3969.03	3739.2	3882.64	4432.0
	ages 12-17	682.26	936.8	831.60	769.6	813.23	877.3
	ages 18+	559.15	861.7	779.37	524.1	730.65	537.9
	all ages	4661.76	6153.06	5580.00	5032.90	5426.53	5847.20
	Expenditures (000's)	\$4,526	\$6,979	\$6,130	\$4,833	\$5,887	\$4,840
	GRP's (all ages) per \$	1.03	0.88	0.91	1.04	0.92	1.21
2007	ages 2-11	3144.50	4959.9	4034.17	3730.2	3969.69	0.0
	ages 12-17	650.40	1166.9	898.99	833.8	885.15	0.0
	ages 18+	410.64	1157.2	786.69	613.8	750.00	0.0
	all ages	4205.54	7284.01	5719.84	5177.72	5604.84	0.00
	Expenditures (000's)	\$2,453	\$5,731	\$4,280	\$2,693	\$3,943	\$0
	GRP's (all ages) per \$	1.71	1.27	1.34	1.92	1.42	0.00
2008	ages 2-11	4202.51	5191.6	5100.12	3147.1	4675.56	0.0
	ages 12-17	980.99	1340.9	1258.29	774.6	1153.13	0.0
	ages 18+	619.91	1632.5	1212.46	714.5	1104.20	0.0
	all ages	5803.41	8165.04	7570.87	4636.15	6932.89	0.00
	Expenditures (000's)	\$3,382	\$7,210	\$5,832	\$2,985	\$5,213	\$0
	GRP's (all ages) per \$	1.72	1.13	1.30	1.55	1.33	0.00

Table 4B. Average Annual GRPs of Brands that would Fail or Meet Different Nutritional Standards

<i>Non-Children's Cereals</i>		Firm Specific CFBAI		Uniform CFBAI		Working Group	
Year	Group	Fail	Meet	Fail	Meet	Fail	Meet
2006	ages 2-11	506.48	327.2	389.93	375.0	387.93	368.1
	ages 12-17	428.31	247.9	329.50	283.7	289.14	325.9
	ages 18+	1320.48	843.2	1013.03	968.6	953.70	1047.1
	all ages	2255.28	1418.29	1732.45	1627.34	1630.77	1741.08
	Expenditures (000's)	\$10,820	\$5,450	\$8,306	\$6,230	\$6,919	\$7,323
	GRP's (all ages) per \$	0.21	0.26	0.21	0.26	0.24	0.24
2007	ages 2-11	758.34	528.1	506.81	608.7	483.00	644.6
	ages 12-17	529.69	345.2	365.83	392.4	332.42	421.5
	ages 18+	2043.58	1181.2	1250.06	1414.8	1292.21	1414.0
	all ages	3331.61	2054.40	2122.70	2415.87	2107.63	2480.13
	Expenditures (000's)	\$13,614	\$6,972	\$8,395	\$8,359	\$8,663	\$8,158
	GRP's (all ages) per \$	0.24	0.29	0.25	0.29	0.24	0.30
2008	ages 2-11	371.55	630.3	427.90	586.5	439.46	594.8
	ages 12-17	299.30	527.4	363.13	477.8	364.96	490.3
	ages 18+	1030.41	1666.3	1188.75	1543.1	1206.12	1570.0
	all ages	1701.25	2824.00	1979.79	2607.36	2010.54	2655.05
	Expenditures (000's)	\$5,538	\$9,774	\$7,158	\$8,514	\$6,623	\$9,218
	GRP's (all ages) per \$	0.31	0.29	0.28	0.31	0.30	0.29

Table 5. Average Excess Sugar Content (in Grams) of Cereals that would Not Meet Different Nutritional Standards

Cereals Not Meeting the Nutritional Standards of:	2006		2007		2008	
	<i>Non-children's cereals</i>	<i>children's cereals</i>	<i>Non-children's cereals</i>	<i>children's cereals</i>	<i>Non-children's cereals</i>	<i>children's cereals</i>
Firm Specific CFBAI	-0.20 (5.16)	0.72 (1.05)	-1.53 (2.32)	0.80 (0.98)	0.33 (2.37)	0.75 (0.93)
Uniform CFBAI	-0.38 (4.95)	1.27 (2.11)	-3.14 (2.35)	1.35 (1.99)	-0.75 (4.39)	1.43 (2.00)
Working Group	1.97 (4.07)	3.13 (2.05)	-1.01 (2.87)	3.09 (1.85)	-2.25 (3.70)	3.29 (2.00)

*Standard errors are listed below mean values in parentheses

Table 6. Average Household Annual Purchase of Advertised Cereals that would Not Meet Different Nutritional Standards

Types of products	Households' children status	Year	% Not Meeting the Nutritional Standards of:			Average Annual Purchase (oz)	No. of households	
			Firm Specific CFBAI	Uniform CFBAI	Working Group			
Non-children cereals	With children under 12	2006	1.3	1.5	7.1	197.6	2,863	
		2007	0.0	0.0	0.5	172.1	3,114	
		2008	0.6	0.2	0.6	195.9	2,890	
	With children under 18	2006	1.4	1.6	7.0	197.1	4,159	
		2007	0.0	0.0	0.5	175.4	4,399	
		2008	0.6	0.2	0.6	194.8	4,130	
	With adults only	2006	1.9	2.3	4.2	148.7	9,664	
		2007	0.0	0.0	0.4	137.1	10,113	
		2008	0.7	0.3	0.7	154.9	10,462	
	Children's cereals	With children under 12	2006	57.1	98.2	99.1	164.9	2,863
			2007	61.1	98.0	100.0	157.2	3,114
			2008	55.4	97.7	100.0	141.0	2,890
With children under 18		2006	55.8	98.3	99.1	159.7	4,159	
		2007	60.1	98.1	100.0	156.0	4,399	
		2008	53.3	97.8	100.0	135.3	4,130	
With adults only		2006	46.7	98.6	99.0	39.3	9,664	
		2007	52.4	98.5	100.0	40.2	10,113	
		2008	46.3	97.6	100.0	36.6	10,462	